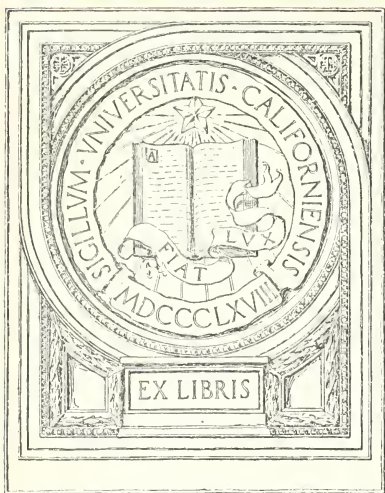


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THE LATE ATTACKS

UPON THE

COAST AND GEODETIC SURVEY.

REPRINTED FROM THE OCTOBER AND NOVEMBER NUMBERS OF
THE UNITED SERVICE, 1884.

PHILADELPHIA:
L. R. HAMERSLY & CO.,
No. 1510 CHESTNUT STREET.
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THE LATE ATTACKS

UPON THE

COAST AND GEODETIC SURVEY.

I.

WITH full appreciation of the value of the opinion of the members of the two military Services, and of the weight of that opinion in influencing the administration of the Governmental bureaus, it is, nevertheless, not to them chiefly as belonging to either Army or Navy, but as being citizens of the United States, and as such interested in good administration, whether civil or military, that a plea should be addressed in favor of the Coast and Geodetic Survey, in view of the two attempts that within as many years have been directed against its life. They, from familiarity with the work, as officers of either Army or Navy, derived from their employment or that of brother-officers upon it, have naturally formed opinions with regard to it. If some have, from personal or more worthy motives, favored a change in its organization, their duty now, as well as that of all, is to reconsider the question, in the interest of the country, from the point of view of citizens of the United States. This medium of publication—THE UNITED SERVICE review—has, therefore, been chosen, not altogether because it is that through which officers of the Army and Navy can be reached, but because the plea, being addressed directly to the people, irrespective of pursuits, will be strengthened by the influence of many who are at the same time officers of the Army and Navy, and who, as well as others, are not at present in full possession of the facts with their legitimate conclusions.

The majority of officers of both Services, at least officers of rank and experience, would, if the question were put to vote, be found

opposed to any change in the organization of the Survey, but yet influences emanating from the Navy, as well as from the Geological Survey, are those which are manifesting themselves in the adverse action lately taken with respect to its organization. This is the opinion entertained by all those best placed to be well informed, fully justified by direct and circumstantial evidence.

It is not purposed here, however, to discuss the questions of the number and character of the forces arrayed against the Survey, least of all to attempt to investigate the motives which have chiefly, if not wholly, led to the attempt upon its organization. Assignment of motives may safely be left to every man's judgment when he has become acquainted with the facts of the case. They cover too wide and various a field to render it a fruitful task to garner them, even if it were desirable to do so; but it is not: on the contrary, their entire exclusion is necessary to the proper presentment of the case.

Let us accept, without a discussion of its merits here, which will find a more fitting place in a subsequent paper, the Coast and Geodetic Survey as a long-established, undeniable fact.

The fact of existence is held among all men, *prima facie*, evidence of the right to exist. The very first *raison d'être* of anything is that it does exist. That is not to say that it has a right to continue unquestioned to exist, because it exists, otherwise there would be no improvement nor even rectification of abuse. But it does affirm that the sentence of deprivation of existence must not be pronounced against anything before the right to exist is, through impartial trial, decided against it. That it has, *prima facie*, the right to exist is all that is claimed.

If possession is nine points of the law, how much more does life, of which possession is but one of the incidents, come under the protection of the law? Whether we think of life as the vital force that actuates human beings, or as the force that actuates an organization, the underlying principle of which we think is the same in both as to question of right to exist until proved unworthy of existence; that is, it is invaded if, without proper care and judgment, that which has come into being, has passed through the ordeal of struggle to recognition, and has attained the stature of an accomplished fact, is modified or destroyed. The principle is impliedly recognized in all law that protects men in their property and life. Why, then, should it stop short of protecting the governmental property of the people? It does not,—the principle is immutable, but the people are not always well represented.

It must be acknowledged that the Coast and Geodetic Survey is an accomplished fact, a recognized existence of active organization, and that the burden of proof therefore lies with those who would deprive it of existence, to show that it is unworthy. No evidence has been

forthcoming to prove that to the minds of any men. If that burden of proof is not accepted by those to whom it rightfully belongs, the negative must and shall be assumed by their opponents. But let us, temporarily at least, without argument now to prove the right of the Survey to exist, accept it simply upon the ground of an accomplished fact, deferring to the future paper to which reference has been made, the demonstration of its right to exist as worthy of existence, and proceed to the consideration as to whether the course taken with regard to it can satisfy the reason of right-thinking men.

It was in vain for the first opponents of the Survey who appeared upon the scene, to claim that their proposition to turn over its hydrographic work to the Navy Department is not destroying, but merely modifying it. That was begging the question: the majority hold that that would be destroying it. But, suppose that that action means merely modifying it, who should have the temerity to attempt such a modification without a full and fair examination of the subject, in which both advocates and opponents should be heard? No such plan, however, was adopted in either of the two late attacks upon the Survey. In that of 1882, upon the *ex parte* testimony of a few persons who favored the transfer of the Survey's hydrographic work to the Navy Department,—of persons, too, whose testimony is by the principles of jurisprudence peculiarly subject to qualification from presumable bias,—the attempt was made at dismemberment of the Survey. No steps were taken by the Secretary of the Navy towards obtaining the opinion, on the other side, of the Superintendent or of other officers of the Survey itself, or that of scientific or mercantile bodies; which, at least informally, he could have obtained even from officers of the Survey. Resistance had to be hastily extemporized by the Survey, until, in due time, the Secretary of the Treasury could come to the rescue, as he did, through the conclusive reports of the chiefs of his various bureaus claimed by the Navy Department. The Secretary of the Navy, reaching the conclusion that the hydrographic work of the Survey should belong to his Department, instead of to the Treasury Department, where it is, recommended to the President in his annual Report for 1882, combined with the aforesaid *ex parte* testimony, that the hydrographic work should be transferred to the Navy Department; a recommendation which he repeated in his annual Report for 1883.

This recommendation, based wholly upon *ex parte* testimony, was unwise and unjust. There certainly can be no difference of opinion as to the unwisdom and injustice of condemnation without even the form or proposal of impartial trial. This proposition, therefore, affords no field for discussion. What, however, does, and is not generally known, is that the Secretary of the Navy, in making it, offended not only against correct rules of procedure, but violated official comity and far transcended the powers of his office.

The Secretaries are the administrators of their own respective Departments, and are the constitutional advisers of the President. The Constitution does not expressly say that they shall advise the President, but the terms used, coupled with long practice which has made precedent, are tantamount to constituting members of the Cabinet not only the President's advisers, if called upon for advice, but his advisers, also, who may volunteer to him their advice.

Section II., Art. 2, of the Constitution, says, "The President . . . may require the opinion, in writing, of the principal officer in each of the Executive Departments, upon any subject relating to the duties of their respective offices," . . . etc. That the opinion of any principal officer may be thus formally required by the President implies that it may be informally required, and, as has been said, precedent has established even beyond, that it may be volunteered by these principal officers. In point of fact, we know that, from the time of Washington down to the present day, governmental questions have been discussed in the Cabinet, and that its officers are truly what they have been popularly designated,—the constitutional advisers of the President. It does not follow that any one of the officers forming the Cabinet may advise with reference to any other Department than his own. On the contrary, his functions are fixed with reference to advisory capacity as to the organization of his own Department, or as to such general topics as may come under discussion in a meeting of the Cabinet. If change of organization in his own Department be in his opinion desirable, it is for him to convince the President of its desirability. It is not for him to proceed further than to advise the President as to his own Department, except in the case of conceivable urgent necessity. It is the President who is responsible to Congress for the administration of what by law exists, and for the recommendation of changes of organization that may to him seem necessary in the Secretary's or in any other Department.

It is evident that the President, in sending in to Congress the Report of the Secretary of the Navy, thereby assumed towards Congress, notwithstanding that he did not explicitly approve of special measures therein proposed, the full responsibility of all the Secretary's recommendations. For the Secretary's included recommendation of the transfer of bureaus of the Treasury Department to his own, the President therefore became, as a matter of course, implicitly responsible. And it is equally evident, too, from consideration of what has been said, that the action of the Secretary was entirely beyond the purview of the Constitution in the clause quoted, granting by implication to Secretaries the privilege of advising the President regarding their own Departments. The power granted was, indeed, to the President, to require in writing, on occasions, from the principal officer in any Executive Department his opinion upon any subject relating to his own Depart-

ment ; whence it is deducible, as has been said, that he may require it verbally ; and through precedent, the officer may volunteer it verbally.

That is a very different matter from the Secretary's volunteering a written Report to the President regarding a question connected with the very organization of the Department of a fellow-Secretary in perfect possession of his faculties. The constitutional clause which has been quoted relates solely to opinion from an officer regarding the administration of his own Department, and that solely regarding an opinion which he is to furnish the President, in order to enable the President himself to reach conclusions with reference to the subject-matter of the opinion.

It has been admitted that the act of the President in transmitting to Congress the Report of the Secretary was, *ipso facto*, by the theory of our Government, equivalent to approval of the matter therein contained. The Message of the President and accompanying Documents theoretically emanate from the same source. But it so happens that the Reports of the Secretaries are really, and by common consent have come to be regarded as, made directly to Congress, and upon that basis they are accepted by Congress and the country. In consequence, a recommendation conveyed in one of them to Congress is not necessarily regarded as the President's recommendation, and if standing unsupported by the Message, may readily be ignored by Congress. But, as by a sudden claim to revival in practice of the theory of our Government relating to this point, any annual Report or portion of an annual Report of a Secretary may be construed by Congress as representing the opinion of the President, it is most desirable that this anomalous condition of affairs should cease,—where theory is at variance with present practice, and where another practice may be made at any time to conform to theory, thus capable of effecting on a given occasion such a change as might well, if effected, seriously militate against the interests of the country.

To show how completely the recommendation of the Secretary of the Navy, through his Report, was, according to practice, regarded as a direct recommendation of the Secretary's to Congress, not really, but only theoretically approved by the President, it is merely necessary to mention that Memorials remonstrating against the recommendation were at once addressed to Congress, evidencing the prepossession, amounting to conviction, in the minds of the remonstrants, that the question might either be acted upon or ignored by Congress. If the conviction had existed that the President had, according to theory, by not expressing approval or disapproval, indorsed the Secretary's recommendation, it would have been known that his action ought not to be, and would not be, ignored by Congress, and the Memorials would not have been sent to Congress.

Again, the Secretary's action was in contravention of all those

amenities of official intercourse that should make a Government's Ministry or Cabinet, call it what one will, present to the world unbroken solidarity. From what Department should advice to the President emanate, specifically to change the status of bureaus placed by law under the Treasury Department? Undoubtedly, from the Treasury Department itself. It must be borne in mind that there are two distinct kinds of organizing,—one of which is creation, and the other administrative formation. It is the latter, with reference to the Secretary's action, that is to be regarded as legitimate,—the former as illegitimate. The Departments are not organizations for successive Secretaries to shape and modify at pleasure, nor, indeed, at all, except under the limitations prescribed by the Revised Statutes of the United States, or through better or worse administration.¹ The Departments being legally constituted existences, placed by law under successive Secretaries, the heads of Departments have nothing to do with radical change in them, amounting to creation, such as would be involved in the absorption of bureaus of co-ordinate Departments. Otherwise, a Secretary of the Navy might, with a long term of office, gradually become also a nondescript Secretary of War, while Secretaries of War were becoming more or less Secretaries of the Navy; or perhaps, in addition to being Secretary of the Navy, might, in the course of time, come to combine in himself, as the Russians used to, the ranks of general and admiral, and, under the President, command everything in the Army and Navy, under the honorary title of high-cockolorum. Secretaries are not legally or morally responsible for the general characteristics of the organizations which they control, either as compared, or not compared, with those under the control of other Secretaries. It behooves each within his own sphere—no more—if he deem it necessary or advisable, to convince the President that his own special organization is susceptible of improvement through radical change. If Secretaries mistake their powers by acting in contravention of the rights of other Secretaries, they should be made by the President to understand that they have not only infringed the rights of other Secretaries, but those of the President in his recommendatory capacity to Congress.

Whether either the President or Congress ever paid enough attention to the recommendation of the Secretary of the Navy to perceive the illegality and general impropriety of the act is, and probably always will remain, unknown. Certain it is that neither took any action upon it; which Congress could have taken through the constitutional technicality which has been mentioned, on account of his recommendation

¹ "The head of each Department is authorized to prescribe regulations not inconsistent with law for the government of his Department, the conduct of its officers and clerks, the distribution and performance of its business, and the custody, use, and preservation of the records, papers, and property belonging to it."—*Title I., Revised Statutes of the United States, Sec. 161 (Edn. of 1878).*

having passed through the hands of the President to Congress, and having become thereby theoretically the recommendation of the President. In his Message of 1882, the President simply recited the fact that the Secretary of the Navy had recommended in his Report the transfer of the Light-House Service, and of the Coast Survey, to the Navy Department; and he recognized the fact of the interdependence of naval and commercial-marine interests, stated by the Secretary, without saying that he coincided with the Secretary in ascribing the decadence of the shipping interests of the country in any degree to the circumstance that there is not a bureau of mercantile-marine presided over by the Navy Department. To recite the opinions of another person is not recommending them. To mention them is not necessarily to perceive an ulterior significance in them.

Beyond the action of the Secretary of the Treasury, in which, with reference to the Secretary of the Navy's first recommendation, in 1882, for the transfer, he called upon the chiefs of the several bureaus in his Department to reply to the allegations and arguments of the Secretary of the Navy (which replies being duly made, were generally considered adversely conclusive by all who read them), the matter went no further at that time. The scientific and mercantile interests of the country had incidentally made themselves heard adversely to the proposition of the Secretary of the Navy, and it was supposed that, without formally receding from his position, he would allow his recommendation to go by default by not renewing it. But, as already mentioned, he did renew it in his succeeding annual Report, in 1883, with like ill-success to that which attended his first attempt.

That the Secretary of the Treasury should not have appealed to the President to shield his Department from the officious action of a fellow-member of the Cabinet, or that the President himself should not, of his own motion, have reprehended and forbidden the action taken, are questions which it would be presumptuous to discuss with any pretense of reaching a solution, in the absence of information which only a member of the Cabinet could impart. It has, however, been shown that, in the abstract, it was the duty of the President, of the Secretary of the Treasury, and of Congress to put a stop to the encroachment of the chief of one Department upon the Department of another. But duty seldom presents itself as sharply defined as in the abstract. Beyond rational speculation, therefore, as to the various causes that may have been at work to allow the Secretary of the Navy to go on unchecked in his course, it is not in the nature of the case possible to proceed. Obviously, among these, accounting for the non-action of Congress, may be placed the supposition that Congress did not deem the violation of law or propriety so unequivocally serious as to warrant notice; or that it felt itself constrained formally to accept what proceeded from a member of the Cabinet, as if coming from the President himself; or,

finally, that it was indifferent to the matter brought to its attention. With equal likelihood we may suppose that the non-action of Congress may have been associated with interest in the subject; but with intention, through letting things take their own course, that they should reach the very conclusion at which they arrived. As for the non-resistance of the President and the Secretary of the Treasury, it must be remembered that there are complications in the administration of affairs, and that, first of all, there is the evident desirability of presenting in a Cabinet a certain appearance of homogeneity to the public eye; which circumstance alone would readily account for the omission of the President and the Secretary of the Treasury to take formal, or indeed any, notice of the aggression of the Secretary of the Navy.

With the failure of the Secretary of the Navy's second recommendation, to effect anything with Congress, the Coast and Geodetic Survey deemed itself safe from attack, at least for a time, when the contest was renewed by an advance from a wholly unexpected and most extraordinary quarter,—the Sub-Committee on the Sundry Civil Expenses Bill, of the House of Representatives,—Messrs. Randall, Forney, and Ryan. This advance was to the Survey unexpected and extraordinary, because Mr. Randall, the Chairman of the Sub-Committee, who was also the Chairman of the Committee on Appropriations, having been in Congress for many years, had never expressed disapproval of the organization of the Survey, and had been, during the late superintendency of Mr. Carlile P. Patterson, lasting nearly eight years, intimate with that gentleman, and regarded as one of his firmest supporters. There was every reason, from the Survey's point of view, to believe that the organization which had apparently met the approval of the Chairman during the superintendency of Mr. Patterson, and which had not changed under the new incumbent, Mr. Hilgard, and that the administration of the work, which also had apparently met his approval under Mr. Patterson, and which also had not changed, would continue to commend themselves to his favorable opinion. But it seems that, with regard to the organization, the opinion of the Chairman had undergone either a revulsion, or else had been long withheld from expression until a time deemed by him favorable for making a change should have arrived. At any rate, the point which it was sought to elucidate is now clear, that the Coast and Geodetic Survey had reason to believe that the Chairman of the Committee on Appropriations was the firm friend of the organization and administration of the Survey. In fact, so great was the faith of the *personnel* of the Survey in his friendliness to the work, that they were wrapped in complacent confidence that, now that Mr. Randall was the Chairman of the Committee on Appropriations, and, as well, the Chairman of the Sub-Committee on Sundry Civil Expenses, the Survey was in appreciative and safe hands. There-

fore it was that the Survey awakened in May with a certain sense of shock to the knowledge that the Sub-Committee on Sundry Civil Expenses had decided to dismember the Survey by transferring its hydrographic work to the Navy Department and its geodetic work to the Geological Survey.

The reader may be tempted to think, as many persons thought at the time, that this new onslaught upon the Survey was concerted between the Chairman of the Committee and the Secretary of the Navy, acting as *deus ex machinâ*, but the supposition is not compatible with the Chairman's well-known hostility to the administrator of the Navy Department. It is more rational to suppose that the same, or some of the same, influences that induced the Secretary to come to his adverse conclusions regarding the Survey, were those that brought the Chairman of the Committee to the same identical conclusions, as far as the hydrographic work of the Survey is concerned, and that thus these two antagonistic extremes met in accord.

As has already been said, as a preliminary to this whole discussion, that the question of motives was discarded, so also, it must now be added, that modes of action, whether doubtful, improbable, or impossible, of all that does not lie upon the surface, find no place here. That a great work has been endangered by a covert, instead of an open advance upon it, is the important, almost the sole purpose of the demonstration here. The actors, their motives, and their modes of action concern and interest us very little. "The evil that men do lives after them, the good is oft interred with their bones."

To be explicit as to the charge here made,—Is it contended here that the Survey is above trial? that, like the king of old, it can do no wrong? Not at all. The charge is the same as that before stated when discussing the action of the Secretary of the Navy with regard to the Survey. The charge is that the Survey was subjected to a mockery of trial, of less moral validity than that of the Star-Chamber,—if, in any case, that can be called trial in which the first that is known of being accused is being condemned. There is no evasion of this conclusion, unless the gentlemen of the Sub-Committee will concede that the Survey was condemned and sentenced without trial.

It is no disrespect to the gentlemen composing the Sub-Committee to say that they, like other men, are not competent in all things. What took in 1843 a mixed commission of army, navy, and civil experts to settle, it is folly to suppose that they, who are not experts, and who, at the same time, did not formally receive testimony on both sides of the question, could settle with anything like approximate accuracy. The gentlemen would, if such a thing were possible, have taken it in high dudgeon if, they having organized an enterprise and conducted it with recognized success for forty years, three men should walk into their establishment, and with a little hasty ciphering with the stub of a lead-

pencil, and the hearing of a few hap-hazard witnesses, decide that their organization must be improved, that they must conduct business otherwise, as prescribed, and have so much, and that much less money for conducting business than they had had for many years, although the means of their employers are abundant. The case is not a whit exaggerated by the illustration. It is possible to think well of the transaction only by the consideration that the gentlemen really thought that they were doing their duty, and did not realize what they had undertaken. In the "Republic" of Plato, Socrates is made to speak thus: "But we charged the shoemaker not to attempt to be at the same time a husbandman, or a weaver, or a builder, in order that the work of shoemaking might be well done; and in like manner we allotted to each of the others a single calling, to which each was adapted by nature, and at which each, by abstaining from the rest, and applying to it the whole of his life, and not neglecting the proper opportunities, would be likely to work well." "*Ne sutor ultra crepidam.*"

Taking no higher than the modest ground assumed with reference to the Secretary of the Navy's action, will not all men agree that an existence like the Survey's, an accomplished, and as generally recognized, a creditable fact, should not be legislated out of existence upon a rider to an appropriation bill? It is only stating in so many words what the inference in every man's mind is, when it is added that, if it be sought to legislate any accomplished fact out of existence, the only fair way is to put it on trial, to summon witnesses, to hear arguments on both sides. The assertion that the modification proposed is not dismemberment of the Survey has already been answered. It would, if carried out, have meant death to the Survey. It was as much a proposition to take life as was the demand in the "Merchant of Venice" for the pound of flesh, and is as cogently answered by the paraphrase, "but not one drop of water." Will the gentlemen say that the Survey was not to be destroyed, but only reorganized? Again we say, that is begging the question. The contemplated action of the Sub-Committee involved more than condemnation without trial, it meant death from vivisection.

That the same view of the justice of its cause was at once taken by many outside of, as well as by all inside of the Survey, was soon evidenced by the action of many prominent men of all parties in different parts of the country; in Washington and out of Washington, among members of Congress, and among men who occupy no position but that of recognized public-spirited citizens. Members of Congress were ready to contest the measure on the floors of the Senate and the House of Representatives. Memorials began to pour into Congress. The Board of Trade, The Engineers' Club, of Philadelphia (of whose First District Mr. Randall is the Representative), and the St. Louis Academy of Science promptly sent in Memorials. The Presidents of

the principal Insurance Companies of Philadelphia, and other business men of prominence, sent in an independent Memorial. The American Philosophical Society and the Franklin Institute prepared to act. The Hon. G. S. Nesmith and thirty other citizens of New Hampshire sent in a Memorial. President Barnard, of Columbia College, and Professor Cook, Director of the Geological Survey of New Jersey, protested against the change. A Memorial from Yale, signed by President Porter, ex-President Woolsey, ex-Governor English, ex-Lieutenant-Governor Wayland, Professors Lyman, Whitney, Thacher, Verrill, Professor Trowbridge, of Columbia College, Mayor Lewis, of New Haven, Hon. N. D. Sperry, Hon. George H. Townsend, Messrs. Charles Hervey Townshend, E. S. Wheeler, Collector Beers, Health-Officer Lindsley, and other leading men of that city, was dispatched to Washington. The Hon. John Welsh, Messrs. Frederick Fraley, Henry Winsor, William Sellers, Fairman Rogers, Wm. P. Tatham, of Philadelphia, wrote personally to the Chairman of the Committee on Appropriations. The Hon. Robert M. McLane, Governor of Maryland, pledged his support to the Survey.

In answer to one of the letters from Philadelphia, written to Mr. Randall, as the Chairman of the Sub-Committee, he stated, in justification of the Sub-Committee's action, the following, among other points. To notice all would require more space than would be properly disposable here. Some not being relevant to the issue which has been distinctly set forth as the purpose of this particular paper, only those intended for notice here are mentioned. In the next paper, occasion will arise to notice others, and perhaps thus, in sum, all of them.

1. The natural place of the Geodetic Survey is with the Geological Survey.
2. The Secretary of the Treasury is not averse to the transfer of the Coast Survey to the Navy Department.
3. The proposed change is in the interest of economy.

These points are answered below, *seriatim*:

1. It is not thought by those conversant with the subject, that there is in the natural order of things any intimate connection between geodesy and geology. Large areas of geological exploration may be based upon geographical reconnaissance, just as well as upon geodetic work, and much more economically. The National Academy of Sciences, and Major Powell, Chief of the Geological Survey, have recognized the fact, in reports to the Secretary of the Interior, that with occasional transient association of the geodetic with the geological survey, merely for the location of the areas over which the geological work is to proceed, there is no necessity for continuous further association, geodesy being the science of precise mensuration of the earth, while geology is the science of the structure of its crust.

2. On June 20, the day following the appearance by invitation of the Superintendent and other officers of the Survey before the Sub-Committee on the Sundry Civil Expenses Bill (an occurrence which in its main bearing will be described in due order), the Superintendent waited upon the Secretary of the Treasury, to confer with him regarding the state of affairs affecting the Survey. The Secretary, in the interview that then took place, expressed himself with much feeling, as decidedly

opposed to the contemplated transfer of the hydrographic work of the Survey to the Navy Department. He said that he had informed the Secretary of the Navy that he desired no disorganization in his Department, that, as he had found the Department, he wished to leave it, with its several bureaus intact.

3. The statement referring to its being more economical to put the hydrography of the coast under the Navy Department, than to prosecute it, as at present, under the Coast and Geodetic Survey, has been so often refuted, that it seems almost useless to repeat the incontrovertible reasons against the project. They, however, are these. Naval men do the work now. They would do it then. The same number of officers who do it now ought to do it then, and would, unless the Navy Department made hydrography, just to employ officers, instead of detailing officers for the needs of hydrography. Plan for plan, then, so far, the expense of each method would be the same. But, as geodetic work is the basis of hydrographic work, and the Navy Department does not conduct geodetic operations, and would have to employ experts to conduct them, the plan of having the Navy Department to do the hydrographic work is much less economical than the present one.

Under the pressure described, from prominent individual citizens, and from scientific and commercial bodies, the Sub-Committee, on June 19, at the very last moment, just before their final action, for the first time summoned officers of the Survey before them for examination upon the subject upon which they should long before have been consulted.² These officers were Superintendent J. E. Hilgard; Assistant-in-charge-of-the-Office, C. O. Bontelle; Assistants Davidson and Schott, and Commander Colby M. Chester, of the Navy, Hydrographic Inspector of the Coast and Geodetic Survey.

The statements that were made before the Sub-Committee were of the strength that might have been anticipated by any one acquainted with the excellence of the organization of the Survey and the ability of the men who made the statements. The fact that the most convincing of all to the Sub-Committee was that of Commander Chester did not lie in his possessing more knowledge and gift of exposition than his coadjutors, but in the fact that he, a naval man of rank and experience, upheld the superior merit of the present organization of the Survey as against any other that could be devised. It had been a foregone conclusion with the Sub-Committee, that the organization would not be recognized as of supreme efficiency by naval men. The Sub-Committee, from first to last, had not heeded the maxim, "*Qui scit ubi sit scientia habenti est proximus.*" The knowledge they needed might have been obtained long before, within a stone's throw of the Capitol.

Under the circumstances there was nothing for the Sub-Committee to do but to recede from their false position, and to beat a retreat, for which their opponents would cheerfully have built a bridge of silver for the retiring enemy. But there are two ways to retire from a moral

² About the middle of May, the Secretary of the Navy, and the Chief of the Hydrographic Office of the Navy, had appeared before the Sub-Committee; and, subsequently, in the same month, the Chief of the Geological Survey appeared before it, and the Chief of the Hydrographic Office reappeared before it.

defeat,—the one, gracefully, with at least implied acknowledgment of error, the other, with the vantage that must soon be lost, in attempting to wrest from opponents fragments of the prize that victory has not won.

The Sub-Committee's action in receding from its position was apparently that of fair-minded men. The *personnel* of the Survey felt at once encouraged by the report that the final action of the Sub-Committee would be to recommend to Congress a Commission, composed of three members of the Senate, to be appointed by the President of the Senate, and three members of the House of Representatives, to be appointed by the Speaker of the House, to settle the question of the disposal of Survey. The *personnel* of the Survey felt now well assured that at last the Survey would be put fairly on trial, and could not but come forth triumphantly from the ordeal. Nor have they changed in that opinion.

They little expected what was impending. Shelter from the storm seemed gained, but then were heard its after-claps. Will any man say that the Sub-Committee, having receded from its first position, having decided that the whole question should go into the hands of a joint Commission composed of members selected from the two Houses of Congress, were not bound, so far as they themselves were concerned, by that act, not only to allow, while awaiting the decision of the Commission, the *status quo* of the Survey, but to maintain it? This the Sub-Committee did not do.

By receding from their first position the Sub-Committee apparently left the status of the Survey intact, but this they did not really do. First, they did not do so, because they crippled the Survey for the whole present fiscal year, by placing its appropriation at an amount lower than any that it has had for sixteen years. Second, they did not do so, by partially begging the question involved in their first intention, by turning over to the Geological Survey a work coming strictly within the province of the Coast and Geodetic Survey, and not at all within that of the Geological Survey, and representing an appropriation which the Coast and Geodetic Survey had had for several years for that purpose,—the incidental provision of geographical points for enabling the States to carry on surveys within their own boundaries.

In presenting his estimates for the coming fiscal year to the Secretary of the Treasury, the Superintendent of the Survey had said,—

“The chief increase in the estimates is for the item of party [field] expenses. . . . The object of proposing this increase is to obtain a proper economic proportion between the expense of putting the surveying parties in the field and the length of time that they can be kept at work. This should be as long as permitted by the season favorable for field work in the several localities. In order to meet this condition, it is necessary that the amount available for party expenses should be at least half as large again as it has been of late years, and I am constrained by a consideration of reasonable economy to submit estimates for an increased amount.”

The amount asked for, to secure this reasonable economy, and approved of by the Secretary of the Treasury, was \$670,500. Did the Superintendent get it? For answer, let us continue to follow the train of events.

The very day after the Committee had receded from its first position, and only the day before the appropriation bills were to be presented to the House, and when Congress was becoming restive under the prolongation of the session into the hot weather, the Superintendent of the Survey was again summoned before the Sub-Committee, and was instructed to reduce his estimates. As well might one of the animals present when the king of beasts made a distribution of the spoils, allotting to himself the lion's share, have hesitated to accept the award, as might the Superintendent or any other man, under the circumstances described, have demurred at the behest of the Sub-Committee, whose will was literally law. So he reduced his estimates. That he did not willingly do so is shown by his statement accompanying his estimates approved by the Secretary of the Treasury.

After coming before a Committee of Conference between the two Houses, and having restored to it the item of \$14,000,³ previously unjustly diverted from the Coast and Geodetic Survey to the Geological Survey, and having added to it some \$2000, the sum-total of the appropriation for the Survey for the present fiscal year is only \$518,070. This gives for field work a sum of \$44,300 less than the Survey had last year, when parties had to be called in from the field for lack of funds to prosecute work urgently needed. The entire appropriation is less, as has been said, than the average amount that the Survey has had for sixteen years. Thus has been answered the Superintendent's plea for a reasonable economy.

The lowest annual appropriation for the Survey, for sixteen years, except that of the present year, was in 1869-70. That was \$487,000. The average appropriation since, from 1870 to 1884,—including fourteen fiscal years,—has been \$622,200. In this year of grace of the Sub-Committee, however, it is only \$518,070, relatively much less than in 1869-70, considering that the country is now more rich and populous, and that there are now largely increased demands upon the Survey arising in part from the growth of commerce and consequent necessity of affording greater facilities to navigation. In 1869-70, 11,420 copies of charts were issued from the Office of the Survey. In 1882-83, 32,012 copies were issued. Of this last number, 12,500 were required by the several Departments of the Government, and by Senators or Representatives,—more than the whole number of copies issued in 1869-70 for all purposes combined.

³ The amount asked for was \$16,000; the same amount as that appropriated for the two preceding fiscal years, but in the Committee of Conference this was reduced to \$14,000.

Entirely ignoring the general principle, of growth demanding increase, involved in the preceding fact stated, and at a time when the Treasury was abundantly able to meet demands upon it for the needs of the Survey, the Sub-Committee set aside the estimates for the work, approved by the Secretary of the Treasury, and in violation of economy reduced the appropriation more than one hundred and fifty-two thousand dollars below the estimates, and upwards of one hundred and four thousand dollars below the average of the appropriations for the last fourteen fiscal years.

If that portion of the Sub-Committee's plan, consisting of turning over the hydrographic work of the Survey to the Navy Department had been retained, of course it would have involved a reduction of the Survey's appropriation by the amount estimated as necessary for the Navy Department, instead of the Survey, to perform the work. The hydrographic work of the Survey not being, as the event proved, turned over to the Navy Department, the inference ought to have been that the appropriation for the Survey would be maintained at the usual rate. But the appropriation was reduced.

There ought to be no question in any man's mind, besides, that if the Sub-Committee gave, as it did give, to the Geological Survey, funds for a purpose which was not at all within the province of the Geological Survey to fulfill, but strictly within that of the Coast and Geodetic Survey, and gave them, too, for a purpose for which the Coast and Geodetic Survey had always received funds and executed the work for which they were appropriated, from which it was now excluded by the act of the Sub-Committee, that, *ipso facto*, the status of the Coast and Geodetic Survey was not maintained by the Sub-Committee; that what the Commission, yet to be appointed, was to determine, was by that act in part prophetically anticipated and predetermined for it by the Sub-Committee. The correctness of the following propositions is therefore unquestionable :

1. The relinquishment of their first proposed intention by the Sub-Committee, being followed by their proposition for the appointment of a joint commission of both Houses of Congress, to investigate the status of the Coast and Geodetic Survey, the Hydrographic Office of the Navy Department, the Geological Survey, and the Signal Service, the implication was that the *status quo* would be maintained while the questions regarding them were pending.

2. This implication was violated by the action of the Sub-Committee, in reducing the appropriation of the Survey to a point below the usual rate.

3. The implication was again violated by assigning to the Geological Survey, with appropriation therefor, work which not only belongs by its character to the Coast and Geodetic Survey, but which was specially assigned to the Coast and Geodetic Survey by Congress, when it authorized the determination of points in aid of State surveys.

4. Inasmuch as the Sub-Committee's original intention contemplated, as part of the project, the turning over to the Navy Department, for hydrographic work, funds heretofore devoted by the Survey to the same kind of hydrographic work,

and as things eventuated, this hydrographic work was not turned over to the Navy Department, the reduction of the annual appropriation for the Survey below the only basis that could afford a datum for deciding upon the amount proper, was in a measure an assumption on the part of the Sub-Committee, of one of the very points, to settle which, among other things, the Commission was supposed to be appointed.

5. In sum, the whole procedure was a manifest begging and acting upon the questions which the Commission only, as shown by what led to its creation, has the right to settle.

6. In view of the excellent condition of the Treasury, the intention of the reduction of the appropriation for the Survey is evident beyond the peradventure of a doubt. It was the maintenance of a position apparently abandoned, because no longer outwardly tenable, in violation of the principles of good faith and right reason.

But while this parsimonious policy, on the ground of economy, in the face of the contrary view as to what would secure economy, held by the Secretary of the Treasury and the Superintendent of the Coast and Geodetic Survey, is being pursued with regard to the Survey, how fared things with the Geological Survey? Let no one suppose that appropriation to a handsome amount for that meritorious work would be begrudged by the Coast and Geodetic Survey. What is sought to be brought out is simply what is implied here,—that invidious distinction was made between it and the Coast and Geodetic Survey.

Last year the Geological Survey received, partly under the Sundry Civil Expenses Bill, partly under the Executive, Legislative, and Judicial Bill, \$339,640. This year it gets from the same sources \$489,040,—an increase of \$149,400. Last year, the Coast and Geodetic Survey had (including \$100,000 for a new steamer) \$655,290. This year it gets \$518,070,—a reduction of \$137,220. So, while the Geological Survey goes up, under the self-same economical impulse the Coast and Geodetic Survey goes down, like the see-saw of the world, not depending more upon merit than upon some chairman acting as candlestick in the middle.

At last, after all this gratuitous friction, things had been forced nearly into the shape into which they should have been first moulded. The Committee of Conference restored to the Coast and Geodetic Survey the item which had been assigned to the Geological Survey for the determination of points for State uses in making surveys,—a question which, it will be observed, could not have turned upon the amount contended for (\$14,000), but upon the principle involved in its diversion from the Coast and Geodetic Survey. Finally, just before its adjournment, the Commission mentioned was named by Congress, according to the mode prescribed. It consists of Senators Allison, Hale, and Pendleton; and Representatives Herbert, Lowry, and Lyman,—all good men and true; who will assume nothing, and who although, with perhaps one exception, not experts, will hear testimony from all sides, judge dispassionately, and decide wisely. This is the result for which the Survey so bravely strove. Pity 'tis that, at this late day, in this

free and enlightened land, among men of our race, that struggle should be possible for simple justice!

The Chairman of the Sub-Committee stated, it will be remembered, that the Geodetic Survey naturally belongs to the Geological Survey,—that is, at least, that they go together. Nothing so far has been given but a simple denial of the correctness of the assertion, coupled with citation of, without quotation from, the published opinion of the National Academy of Sciences, and that of Major Powell, the Chief of the Geological Survey. Let us now consider the statement in detail, in the light of the report of the National Academy of Sciences, in answer to the requisition of Congress upon the Academy, to take into consideration the best methods of apportioning to different agencies the various national surveys, and to report thereon to Congress; and of the report of Major Powell, written under instructions, in the same connection, to the Secretary of the Interior, in order to furnish data to the Academy.⁴

The report of the Academy, under date of November 6, 1878, says,—

“In view of the paramount importance of the public lands, the committee recommend that the Coast and Geodetic Survey be transferred from the Treasury Department to the Department of the Interior, retaining its original field of operations, and assuming also the entire mensuration of the public domain, and that, so modified and extended, it hereafter be known as the United States Coast and Interior Survey.”

Major Powell's report, under date of November 1, 1878, advised inferentially to the same general intent, as follows. It must be borne in mind that triangulation and hypsometry (the determination of heights) are peculiarly functions of the Coast and Geodetic Survey, and not specially of the Geological Survey, which has neither officers nor instruments to conduct those operations with refinement.

“The geographical work [that is, for the geology of the interior] should be based on a transcontinental triangulation on a comprehensive plan, and carried on with proper refinement. With the work divided as it has been for the past ten years this is practically impossible. No one organization with its small appropriation can make the necessary outlay of money for this work without swallowing up the whole or greater part of its funds, and thus it would be prevented from doing other work. All of the scientific [interior] surveys which have been carried on for the past ten years are practically ‘in the air,’ because this fundamental condition of accuracy has been neglected.

“For the hypsometric work transcontinental lines of level should be established to which all the base stations in the field should be related by connecting lines. With the multiplicity of surveys and the small appropriations for each, it is impossible to have this work done, as it is impossible to have the transcontinental triangulation made. . . .

“Under the Coast Survey a transcontinental triangulation is now in progress and much has already been accomplished, as the Coast Survey has a very large number of persons trained as experts in geographical science. Two such systems

⁴45th Congress, 3d Session, House of Representatives. Mis. Doc. No. 5.

of triangulation are unnecessary; the one now in progress should be made the basis of all future geographical work in the United States."

So much may be said for the wisdom of the transference of the interior geodetic work of the Coast and Geodetic Survey to the Geological Survey, in the light of presumably the best knowledge, outside of the Coast and Geodetic Survey, extant upon the subject. What can be said for the wisdom of transferring the hydrographic work of the Survey to the Navy Department is summed up in the consideration that the hydrographic work is based upon geodetic work, and that the Navy Department is not versed in geodesy. That is a general and conclusive reason, which ought to be operative at all times against the project. When we come to consider, in addition, the unfavorable opinion entertained by the Chairman of the Committee on Appropriations, as to the administration of the Navy Department, it is strange that he should have been found to advocate any change in the Survey that would place anything additionally to what it has already, under the charge of that Department. One should suppose that even if he considered it, from one point of view, desirable that the so-called geodetic portion of the work (for it is all geodetic) should go to the Geological Survey, the effect of thus necessarily relegating its hydrographic work to the Navy Department would have acted as a sure deterrent.

Without reverting to remote utterances of Mr. Randall, that might, perhaps, be thought to represent opinions as to the Navy Department that he no longer holds, let us go back no further than to a few days before the end of the last session of Congress, and quote from the Congressional Record, as authority, his words representing his opinion at that time of the Department to which he would have allowed the hydrographic work of the Survey to go. Referring to the Navy Department, Mr. Randall said in debate, July 1, 1884,—

"But I am willing to go further and say if it were necessary that there are not thrown around these propositions those safeguards for the expenditure of the money which circumstances known to the country demand in reference to a Department which is now being investigated."

He also said in the same debate,—

"That has no relation, perhaps, to these cruisers or to the monitors. But it has relation to the action of every member of this House when we appropriate money to Departments wherein maladministration has been found, that we may see that proper restrictions are thrown around this expenditure."

Thus may one man's word for economy outweigh that of millions. In a matter of the kind of the Coast and Geodetic Survey, a committee on appropriations is the sub-committee, and the sub-committee is the chairman, and the chairman may be—economical. And if the chairman of the committee be the chairman of the sub-committee, the circle is completed which is as vicious in legislation as in reasoning. This

chairman knows all things,—all things that are known, and all things that are unknown. Whatever men consider incredible from their experience, are to him, like other things, among the known. Not even the Pope can speak more *ex cathedrâ* than he upon matters of faith and morals. With his vast range, seasons and planetary sway change before the all-powerful talismanic word—economy. Climate is obedient to its behests. The Survey with meagre means, and unprepared, seeks the field in the torrid, to push its toil into the frigid season, instead of going out in the vernal bloom and returning in the mellow autumn. Why not? all things are possible to such economy but—economy.

O Uncle Sam, dear Uncle Sam, your coat may be short-waisted, your trousers skimpy, your face weazen, and your nose a trifle sharp, but not a mean bone have you in your body! A sensible, marvelously shrewd old fellow you are! You would not have said, with the Chairman of the Committee, in the debate just quoted from,—

“As an instance of the moral attitude of the American people, I want to say that it was an American minister who was selected by the two great powers, Germany and France, to regulate around Paris the matters of surrender and accommodation between those two countries. I wish to say further that my experience in traveling in foreign lands has shown me that where an American citizen behaves himself he receives unbounded respect; when he utters the words, ‘I am an American citizen,’ they are a passport to respect and honor everywhere.”

It strikes you, dear Uncle Sam, that the grandeur recognized here is much more derived from the American citizen’s behaving himself, than from any love mingled with terror that his name inspires abroad. The picture is much better drawn for a *café-concert* scene in Paris, than for one where an American could speak with the proud port with which a man could once say, I am a Roman citizen. France went into the Franco-German war with a moral attitude, and found the invulnerability of her name a quite insufficient panoply. It is not by gasconading about its moral force that a nation is safe from aggression, but by diffidence of its physical strength and preparation for the day when it will surely be tested. France found that the elements of power were hers, but rather in the thunder’s roar than in the lightning’s stroke. Frenchmen were given to such vaunting just before her fall, as many of her best men have since deplored. One of her greatest writers said, “Extinguish the torch of France, and the whole world would howl in the darkness.” Other writers preceded and followed him in this insensate strain, until much of the arrogance leading to her downfall grew out of the assumption, that to be a Frenchman was an all-sufficient mark of divine favor and protection. The writers merely voiced the sentiment of the people.

Mr. Eaton, of Connecticut, struck the key-note of diplomatic relations when, in this same debate, he said with regard to a little difficulty with the Argentine Republic, “A canoe is all you want to deter-

mine differences between this country and those little republics." It is different when great republics or monarchies pay their respects with ironclads. James I., in his wadded armor, prating of "king-craft," was not more ridiculous than this great nation dressed in its crazy-quilt of appropriations for national defense.

Yes, dear old Uncle Sam, if you could only stalk into those legislative halls—in order, or out of order, for you have been robbed of your credentials and have no seat at present, you would say, "Better a few experimental ships than none. Better, a thousand times, departmental mismanagement than management that prevents mismanagement by leaving your naval officers, unpracticed, ashore, your guns unmanned,—or rather no guns to man,—your ports at the mercy of a first-class ship. Which is the more economical—to save a few millions, or to pay a milliard for New York under contribution? Go on, and Simon Stylites on his column will be your true symbol of national economy for defense!"

One thing is certain. Let every despondent man hug it to his soul. It was never better phrased by any one than by St. Augustine, in these words: "It is well that a man should, willingly rather than unwillingly, surrender to the truth; for that he shall, whether denying or confessing it, be vanquished by it, is inevitable."⁵

⁵ "*Bonum est homini ut eum veritas vincat volentem, quia malum est homini ut eum veritas vincat invitum. Nam ipsa vincat necesse est, sive negantem sive confitentem.*"—S. Aug.

II.

THE reasons for a great country's survey of its coasts were in 1858 so admirably given in the report of a committee of twenty members of the "American Association for the Advancement of Science," with reference to the history and progress of the American coast survey, that no more fitting introduction could be found for the presentation anew of the subject, from whatever point of view it may be regarded, than the reproduction of those reasons as set forth in the words of the Committee. When, additionally, we come to consider the eminence of all the gentlemen whose names appear on the list of that Committee, whatever they said in reference to the subject, whether general or special, possesses an authority for which it would be in vain to seek elsewhere as so compendiously offered to the purpose here in view. That purpose is to show why a geodetic survey should be, and what it should be, and that what it should be, the Coast and Geodetic Survey is. Even the general reader cannot fail to see, after the exposition to be here made, that conceived and organized as ours was by some of the most gifted men America has produced, and being what it is, effecting what it does, it is not to be trifled with by amateur statesmanship, and that its present representatives, who hold it in sacred trust, would be derelict to duty if they submitted tamely to its destruction through a vandalism as regardless of its past and present services as of its world-wide renown.

The Committee of Twenty¹ said,—

"The leading object directly proposed in the conduct of the American survey,

¹ The gentlemen composing the Committee were Judge J. K. Kane, President Amer. Philos. Society; General Joseph G. Totten, Chief Engineer U.S.A.; Professor Benjamin Peirce, Harvard College (afterwards Superintendent of the Survey); Professor John Torrey, U. S. Assay Office, New York; Professor Joseph Henry, Secretary Smithsonian Institution; Professor John F. Frazer, University of Pennsylvania; Professor William Chauvenet, U. S. Naval Academy; President F. A. P. Barnard, University of Mississippi; Professor John Leconte, College of South Carolina; Professor William M. Gillespie, Union College; Professor F. H. Smith, University of Virginia; Professor W. H. C. Bartlett, U. S. Military Academy; Professor Wolcott Gibbs, Free Academy, New York; Professor Stephen Alexander, College of New Jersey; Professor Lewis R. Gibbes, Charleston College;

as in that of every other, is to secure the safety of the wealth hazarded in commercial enterprises, by reducing to a minimum the dangers of navigation. But it may by no means hence be justly inferred that the benefits of such a survey are limited to particular localities, or confined to particular classes or portions of the people; that they accrue, for example, exclusively to the great marts of commerce, or to the individuals directly and personally concerned in foreign trade. To any one who attentively considers the causes which give to property its value, it will be manifest that these benefits extend to every citizen, no matter in what part of the country he may reside, provided that he has anything whatever at stake in the prosperity of the commonwealth, even though it be no more than the labor of his own hands. The cotton-grower of Tennessee, and the tobacco-planter of Kentucky, whose agricultural products seek a market in the old world, are no less positively interested in whatever may diminish the dangers of the seas than the merchant who, without producing himself, makes it his business to convert their productions for them into the equivalent values they require. This remark is one of great importance. Nothing in these days is more common than to hear the three great departments of human industry—agriculture, manufactures, and commerce—spoken of as if they were interests entirely independent of each other, or even absolutely antagonistic. Yet, without the productions of agricultural and manufacturing industry, commerce would have no material; and without the constant, and convenient, and rapid exchanges which commerce effects, agriculture and manufactures could have no life. Whatever makes commerce easy, or diminishes the cost or the hazard of its operations, encourages productive industry in every form, and renders its rewards more certain and more abundant. For the sake of illustration, let for one moment, the effect, so often illustrated under the eyes of the present generation, be considered, of opening up to public use a new line of communication, by means of a railroad or canal. There are thousands of farmers in this country who, immediately on the occurrence of such an event, have seen the products of their labor practically doubled or tripled in value, through the consequent reduction in cost, trouble, and loss of time, experienced in communicating with markets. There are exhaustless deposits of mineral wealth in every quarter of the country, which from being absolutely valueless, because unavailable, have become sources of rich income to their owners, simply in consequence of the creation of such artificial channels of transportation. Now, as the aliment of commerce is the surplus production of the country, it is self-evident that, if the ocean were to become suddenly impassable, this surplus production would be to the nation precisely what the unsalable produce of the isolated inland farm, and the slumbering wealth of the inaccessible mineral deposits, are to their individual owners. Since it could find no efflux, it could bring back no return. And though were such a state of things suddenly to supervene upon the arrangements of business as they actually exist, the first ruin would fall, of course, upon the commercial holders of this surplus production; yet it requires no argument to prove that the permanent suffering must fall ultimately upon those who created this surplus,—must fall, in short, upon the whole body of producers in the country; and this, too, without any regard to the question whether or not each has contributed his distinct share to the visible surplus, or whether only his industry has been employed and rewarded by those who have actually done so. And any conclusion at which we may legitimately arrive, in regard to the effect upon the national welfare, of an entire extinction of foreign commerce, arbitrarily supposed to occur, is measurably true also on the supposition that the same commerce is obstructed by impediments which embarrass its operations, but fall short of its total extinction.

“Such impediments do actually exist in the natural dangers of the ocean border.

Professor Joseph Winlock, Superintendent Amer. Naut. Almanac; Professor James Phillips, University of North Carolina; Professor William Ferrel, Nashville, Tenn.; Professor Edward Hitchcock, Amherst College; Professor James D. Dana, Yale College.

The sea-coast lies outstretched, a continuous, unbroken barrier, obstructing every avenue through which it is possible for the surplus production of the country to find its efflux or receive its returns; laying the whole industry of the nation, in every department, and throughout the entire extent of its territory,—in the pioneer settlements of the West, no less than in the busiest of the commercial *entrepôts* of the Atlantic seaboard,—under a perpetual and inexorable tax. To effect a reduction of this tax is the present business, as it was the original design, of the Coast Survey; and the interests of the States which lie most deeply situated in the heart of the continent are not less positively involved in the careful execution, and in the prosecution to completion of this great work, than those of any others."

In one sense, a survey of a coast, especially of one like that of the eastern shores of the United States, can never be finished. When the Committee spoke of the completion of the survey of the coast, it was only in the sense of the accomplishment of the work as a whole. The discovery of harbors of refuge, of new channels, the providing of information for determining upon the sites for light-houses and for sea-coast fortifications, and many other elements of knowledge, are the first kinds of information which any coast survey is bound to provide. After that, the day will come when the survey of this, or of any other coast, being in one sense completed, it will be necessary then only to keep pace by means of a permanent corps, smaller than the one first employed, with the changes in the channels and harbors of the coast. The coast of the United States, especially on the Atlantic seaboard, must, owing to its conformation and the materials of which it is composed, be subjected by the action of the elements to unceasing, visible change, and must therefore always continue to require and receive constant supervision, and, wherever needed, topographic and hydrographic revision in the interest of the mariner.

If, at the date at which they reported, the Committee of Twenty could speak so earnestly as they did throughout the whole of the voluminous pamphlet which the American Association for the Advancement of Science published regarding the history and progress of the Survey, how much might now be added to what they said, when it is considered that, since then, the Survey has, under its new name of the Coast and Geodetic Survey, and authorized to that effect by Act of Congress, pushed its operations into the interior of the enormous domain of the United States; that, in connecting the Atlantic and Pacific coasts by its lines of triangulation, it is incidentally furnishing to States means for making their own surveys of any degree of nicety; that, directly and indirectly, it is furnishing the Geological Survey with the data needed for extending the geographical reconnoissances of that work in the interest of the development of the mineral wealth of the interior; and that, in proportion to its progress, it also directly and indirectly furnishes to the land-surveys the data long needed by them for land-surveying, which, heretofore disastrously imperfect, has nevertheless cost the Government for work, therefore

inadequately executed, a hundred million dollars, and entailed endless litigation upon the people, in consequence of the absence in it of proper scientific basis.

All that is worthiest is born in travail, and has the most intense struggle for existence before it can reach its full development, and must continue to contend throughout its career: the Survey is no exception to the rule. It is the law of life, which, even in its physical aspect, physicians tell us, is from birth to death, only struggle against the grave. Before a worthy project has a chance of coming into being, minds must exist not only great enough to conceive and bring forth the idea, but endowed with a resolution and favored with an environment fitted to insure that the product shall not be abortive. Several years after the time when the idea of the survey of the coast of the United States was conceived and put into execution, the slight knowledge of cognate matters still existing among even educated men in authority rendered it possible for Mr. John C. Calhoun to elevate his eyebrows in surprise, when informed by an officer of the Army that it would be a real economy for the Government to pitch into the sea all the instruments then furnished to the Corps of Topographical Engineers. To most, even educated, men of that period, mathematical instruments were as so many pickaxes, crowbars, and spades might have been reckoned by them,—more delicate, but essentially tools. Of the higher conception, that regards the operator as the most refined of all,—the product of original aptitude, of intelligence, and of rigorous mental and physical training, all combined,—they had not the faintest notion.

The idea of the Coast Survey of the United States was conceived many years before the Survey was effectively ushered into the world. In fact, the Survey may truly be said to have once or twice entered the world still-born. The idea, by whomsoever first conceived, was first suggested by Robert Patterson, of Philadelphia, professor of mathematics in the University of Pennsylvania, and he is therefore entitled to the credit of its first conception.² Being intimate with President Jefferson, he took advantage of the opportunity of impressing upon him and the members of his Cabinet, of whom one was the celebrated Albert Gallatin, Secretary of the Treasury, the desirability of the work. In consequence, through the recommendation of Mr. Jefferson, Congress passed an Act, in 1807, the first relating to a coast survey of the United States. This was followed by a circular from Mr. Gallatin, inviting attention to a general project relating to the survey, under the respective heads of astronomy, trigonometry, and hydrography. Among the applicants for the posi-

² He died in 1824, aged eighty-one. He was professor of mathematics in the University from 1779 to 1814. He was appointed Director of the U. S. Mint in 1805. He was President of the Amer. Philos. Soc. from 1819 until his death.

tion of chief of the survey was Mr. F. R. Hassler, whose detailed plan for the work was adopted, and who was appointed Superintendent. That Mr. Gallatin, who was a Swiss, influenced the appointment of Mr. Hassler, because he also was a Swiss, is not likely. Mr. Gallatin's distinction was acquired not more by his great ability, than by his purity and single-mindedness for the good of his adopted country. Mr. Hassler had acquired a European reputation through his geodetic survey of the canton of Berne, in Switzerland, and was pre-eminent in equipment among all competitors for the place. The excellence of his appointment was fully confirmed by his subsequent conduct, with most imperfect means, and under exasperating delays and want of appreciation, of the American survey in the troublous times of its inception.

Mr. Hassler having been appointed, the path seemed smooth to success. Mark the event with reference to the anticipation. The Act of Congress creating the Survey was passed in 1807. Mr. Hassler was appointed in 1811. He proceeded to Europe to have constructed the necessary instruments for the work. Europe was profoundly disturbed and general war imminent; the United States and Great Britain were on the verge of rupture; everything was unsettled. In consequence, Mr. Hassler did not return to this country until 1815, and it was not until the year following that some slight beginning of the survey was made in the vicinity of New York bay and harbor.

The work, thus scarcely begun, was soon suspended through Congress failing to make any appropriation for it; and, in 1818, that portion of the Act of 1807 under which Mr. Hassler had been appointed was expressly repealed. The bill making appropriations for surveys contained a proviso that the Survey should be conducted only by officers of the Army and Navy. That, of itself, even without the express terms of repeal, rescinded that portion of the Act of 1807 which had had the effect of making the organization partially civilian; Section 3 of the Act having made it discretionary with the President to employ civilians. Thus the Survey, even in the small way in which it had been begun, was not suffered to last two years.

So great were the evils resulting from this change, that they soon became apparent, and in 1832 Congress reorganized the Survey by reverting to and reviving the Act of 1807. It was probably as much through the influence of the Hon. S. L. Southard, then Secretary of the Navy, as through all the other influences combined, that Congress was convinced that it had made a mistake in departing from the law of 1807. When a Secretary of the Navy could report, as the Hon. Mr. Southard did, that the administration of the Survey for the period from 1819 to 1828 had produced desultory work, charts expensive and unsafe, and that he advised recurrence to the law of 1807, his recommendation must have come with great force.

This original Act of Congress, of 1807, had made the administration of the Survey civilian, and had placed the Survey under the charge of the Treasury Department. That administration was now, in consequence of the revival in 1832 of the Act of 1807, once more resumed in the conduct of the Survey. Mr. Hassler again took charge of the work, and directed it until the time of his death, in 1843, hampered by petty appropriations, and under the necessity of accepting a transition period, of which his successor, Professor Bache, was to reap the benefit in collected material, in perfected methods, and most of all, in trained men. Hampered as he thus was, and often disappointed and embittered, as he necessarily was, at the slight appreciation of what was effected, as shown by urgency for more results, in the face of the most meagre of appropriations for the Survey, it was not until 1843, just before his death, that he was triumphantly vindicated in regard to the excellence of all his means and measures, as the result of an investigation ordered by Congress, through a mixed board composed of distinguished civilians and officers of the Army and Navy, which board concluded its sitting with the following recommendation:³

“That inasmuch as the object and purpose of the survey of the coast refer principally to the commercial interests of the country, and as all the laws of Congress in relation to the same contemplate the employment of civilians and officers of the Army and Navy upon said work, it is the opinion of this board, and they do hereby respectfully recommend, that it should be under the control, and considered a part of, the Treasury Department.”

Even after the resumption, in 1832, under the Act of 1807, of the first, the tried, the approved excellent organization of 1807, there was a slight interregnum, so to speak, in the transference, in 1834, of the Survey from the Treasury Department to the Navy Department, without, however, interfering again with the organization. This plan endured for only a short time, owing to difficulties encountered in having placed under one military department a work employing officers from both branches of the military service; and at the end of two years the work was retransferred to the Treasury Department. There, in the Treasury Department, it has since remained, as has been said, and received in 1843, after the long probation there from 1834 to 1843, such indorsement, as to both its organization and administration, as should have put an end to any further interference with them.

But the spirit of innovation, change, and unrest which will not let well alone, and the common failing of untutored ambition, in seeking the place instead of letting the place realize its ambition to secure the man,—the bane of our political condition,—have kept the Survey from 1843, even to the present time, almost constantly on the alert, either to

³ The gentlemen who composed this board were F. R. Hassler, James Ferguson, Edmund Blunt (civilians); James Kearney, James D. Graham, William Turnbull, William H. Swift, G. W. Hughes (Topographical Engineers, of the Army); Thomas R. Gedney, George S. Blake (Navy).

repel assault upon its organization, or to escape insidious approach and appointment to its command. It is one of the follies that men commit, to aspire to place and power which they cannot fitly fill and exercise, and achieving their desires, to feel and look diminutive, shrunken, and collapsed in the robes in which they have had themselves arrayed. To be capable of being Superintendent of the Survey, and to be that, might well make any man proud; but to be Superintendent without the capacity, would, one should suppose, make him feel mean indeed.

If any question can be definitively settled, this might have been allowed to rest as such. But it was not so. In 1848, only five years after the decision of the mixed board, just-mentioned, approved by the President of the United States, an attempt was made to transfer the Survey to the Navy Department. In 1849 another attempt was made. The urgency still continuing, in 1850 the Senate called upon the Secretary of the Navy, to state what advantages would accrue from a transfer of the Survey to the Navy Department, and upon the Secretary of the Treasury, to state why, if in his opinion it were not advisable, the transfer should not be made. The respective replies were such that Congress deemed it inadvisable to make the change. So conclusive was the result, that thenceforward, up to the present time, no further serious attempts upon the organization of the Survey have been made, until the late ones by the present Secretary of the Navy and by the statesmen of the Sub-Committee on Sundry Civil Expenses, of the House of Representatives.

In the year 1871 the functions of the Survey, then known as the Coast Survey, were enlarged, through the addition, by Act of Congress, of the duty of "extending the triangulation of the Coast Survey so as to form a geodetic connection between the Atlantic and Pacific coasts of the United States, . . . provided, that the triangulation shall determine points in each State of the Union which shall make requisite provisions for its own topographical and geological surveys."⁴ Under this last clause, eleven States have already availed themselves of the privilege conferred by Congress, and have in active prosecution work of the kind described; for which the Survey, now acting under the name of the Coast and Geodetic Survey, furnishes the preliminary data, the general direction necessary, and all the special assistance allowed by law and available. Under the title now, as has been said (in consequence of this enlargement of its functions), of the Coast and Geodetic Survey, the work, which is really geodetic in all its parts, has, on the one side, hydrography, with which it is intimately associated, based on geodesy; and on the other, interior work (State—Geological—and Land-Surveying), with which it is properly only co-ordinately associated, also based on geodesy.

The National Academy of Sciences, acting by request of Congress,

⁴ Act approved March 3, 1871.

recommended, in 1878, the combination of all the surveys of mensuration under the Coast and Geodetic Survey, and the establishment of a geological work (the present Geological Survey), to be intrusted with the duty of making a geological survey of the country, with the view, primarily, to the discovery of its mineral and other natural resources, with the necessarily connected paleontology; and secondarily, to other matters specified; to all those cognate matters, in fact, which naturally fall within the province of geological investigation. A sound basis seemed to have been reached, through the recommendation of the Academy, for the future interest of the country, in the related maintenance of these two works, and that of the Land Office, correspondingly related through the recommendation of the Academy in the form most likely to be productive of good. Effectively, these organizations were working more and more on this basis. The advice of the Academy to place the Coast and Geodetic Survey under the Interior Department was only an incident of the full recommendation. Essentially the basis was, as it had been before formally defined, that of the work in actual operation.

This, the period of symmetrical development, was the time chosen by the Secretary of the Navy for his late attempt upon the Coast and Geodetic Survey, prompted by interested persons in his Department, and fully detailed in the preceding paper. The Survey was aroused to the knowledge that all that had passed in these years of contention; that the disinterested published testimony of scientific men, the numerous Memorials of merchants, had been of no avail; that it was only by renewed appeal to the scientific and mercantile community, and to the people at large, that escape for the Survey from defeat and capture could be secured, and a final sweep be made into the ocean of oblivion, of those antagonistic forces that have so often imperiled the existence of the work. The Survey is not captious and pugnacious. Its mission is one of peace,—to bind even the nations of the earth together. But all things must either fight or yield and be trampled out of existence, and he who prides himself upon non-resistance confesses that he is safe through a courage which is not his own. The Survey, therefore, although averse to strife, reflecting on this, welcomed the first sound of attack with joy, that this question must now at last be settled, once for all, in the Survey's assured peace through its adversaries' crushing, final defeat. Why, it may be asked, is the contest to prove more conclusive now than ever before? The reason is evident: it is because the arena upon which it is now taking place is before a public grown to knowledge of affairs, fearful of retrogression in civil service reform, and disposed to give the strongest moral support to all that savors of good administration.

The issue had to be as soon and as resolutely accepted as it had been presented by the Secretary of the Navy. Eternal vigilance is the

price of everything worth having, and although it is not strictly within the line of its profession to take the scalp of any honorable gentleman, least of all of one who has innocently placed himself in the forefront of danger, yet, as self-preservation is the first law of nature, the Survey must be forgiven if, although with certain regrets, it felt constrained to do so, and regarded the acquisition as one of the most notable, if not most beautiful trophies of its career. That it is still upon the war-path is not to be ascribed to its feeling that it has anything further to demand of the Secretary of the Navy, but that there are other trophies of the same sort which the cause of justice demands. If honorable gentlemen choose to come into one's house to set things to rights with a hatchet, the only adequate response is the tomahawk.

Into the question of the propriety of the Secretary of the Navy's action, the preceding paper fully entered. It left untouched, however, in default of space, arguments with which he is no doubt familiar, for they have been in the air for years, both constant in sound and fitful in energy as the strain of an æolian harp. For them he is not, in one sense, responsible. But, while he is merely the mouthpiece of some, he is the representative of all. To one class of these arguments, therefore, which, if not he, many of those under his wing hold, it is necessary now to devote some notice. Because he, the Secretary, relies chiefly upon his opinion, that it is in the nature of things that the hydrographic work of the Survey, as well as many other things, should be under the Navy Department, and possibly the Department under him, it is not useless that he should also consider grounds upon which some of his clients pin their faith in advocacy of the same cause. Then, when he has well conned these, and the further discussion, in its proper order, of the pleas of economy, efficiency, etc., and has measured them with the opinions of scientific and commercial men, he will doubtless change his opinion, and perhaps, too, his course, which has hitherto been, alas, with perhaps good intention, quite misguided!

Coincidentally with the advance of the Secretary of the Navy, in 1882 and 1883, as the champion of the measure for placing the hydrographic work of the Survey in the hands of the Navy Department, was heard a faint and familiar chirp of encouragement. It sounded not like the voice of the war-eagles of some twenty years ago, nor like that of those who have since moulted and soared to knowledge above the nest, but like the peek of the callow brood, with no whither obvious to try their daring flight over the cloud-empurpled seas. They are at the romantic age, when wishing for a thing makes it ours. Here is a whole romantic race, born like St. Paul, out of due time, waiting perforce for the millennial era, when perfect ships and departments shall always be, and shall cause committees on appropriations to risk perfection,—a race waiting for something to turn up, meanwhile roosting almost anywhere, poor devils, until it please economical committees on appropriations

to build them something on which to float, and to let them fulfill the mission for which they were born and prepared.

This plaintive cry said, "(1), the water belongs to the Navy; (2), the Government having educated us, ought to make use of our services in some way; the charge of the survey of the coast is one which we will suggest; (3), the Navy does the hydrographic work of the Coast and Geodetic Survey now, and ought to get the credit for it."

As for the water belonging to the Navy, even merchantmen go down to the sea in ships, and the Atlantic has been crossed in a dory. The Declaration of Independence proclaims for every man the right to life, liberty, and the pursuit of happiness, in which, to most people, the item of comfort of bathing is included, for their own sake and that of the rest of mankind.

That, because the Government has educated a man to do a thing, it should, if it no longer wishes the thing done, make employment for him in some other thing, lest the education go a-begging, is a surprising proposition. More surprising still is the proposition that this one or other thing which the Government is bound to furnish, because it has already furnished in the education a goodly thing, must be conferred at the expense of ousting from, or sensibly degrading in, their positions, men who have paid for and provided their own education, and supported themselves while acquiring it, and have finally served a long apprenticeship to their profession. To cap the climax, if it be not capped already, most surprising of all is the proposition involved, that these men who are to be ousted, or sensibly degraded, are ones who, being fitted for and having paid in every humanly possible way in which a man may deserve, for the position which they hold, are to be supplanted by men who are not, but must begin to be, fitted, and must remain always, unless they desert their legitimate profession, measurably unfitted for the task assumed. Truly, this is scriptural with a vengeance, "for unto every one that hath shall be given, and he shall have abundance, but from him that hath not, shall be taken away even that which he hath."

The theory of old with reference to the Academies was that, even if the Government did not happen to need the services of certain graduates, it had conferred a goodly thing in the education given. Indeed, the justification by the people, of conferring education, possibly without return, always was that, in case of war, what the Government had sowed in the interest of the nation would be reaped an hundredfold in the knowledge and skill ready to spring to the assistance of the country. Conversely, the theory was equally accepted by the practice of graduates not deeming it honorable after graduation to leave the Army or the Navy without service that should in some sort be deemed the equivalent of what they had received. What applies to West Point and to Annapolis is no special dis-

covery of theirs, but within the knowledge and practice of all honorable men.

The statement of any one that the Navy does the hydrographic work of the Survey, and ought to receive the credit, which implies that the Navy does not get it, would be silenced forever by the knowledge which even a cursory examination of the Survey's annual Reports would impart. The following information, compendiously stated, may reassure the minds of those who are indisposed to make a search, or to take any trouble in seeking information, that withholding credit from naval officers has not been one of the sins of omission of the Survey.

From the Survey's Annual Reports from 1867 to 1883—both inclusive. Showing the number of pages devoted in the Annual Reports of the Survey, to naval officers, relatively to the whole number of pages in the Reports.

Year of Report.	Whole No. of pages. ⁵	Number of pages relating to Hyd. work by naval officers.	Number of naval officers in charge of Hyd. parties.	Number of naval officers on Coast Survey duty. ⁶
1867	43	1	1	15
1868	39	1	1	19
1869	61	2	1	6
1870	50	2	1	6
1871	67	1	3	12
1872	51	3	3	17
1873	64	2	3	17
1874	45	1	4	26
1875	69	7	7	46
1876	64	13	12	47
1877	67	11	12	59
1878	64	12	12	53
1879	74	10	13	56
1880	59	4	11	60
1881	66	6	10	57
1882	67	6	9	73
1883	74	10	17	67

If the significance of the table is not apparent, the senior will doubtless take the pains to point out to the junior officers from whom the cry has come, that there is no evidence of neglect to give credit to be drawn from this source. If its authenticity be doubted, there are always the published Reports to be referred to for confirmation or disproof of this tabular review.

Search has been made in vain to find anything in the Reports that would justify a feeling among the younger officers that they have been neglected, except in the discovery of invidious discrimination in favor of certain naval officers, as compared with others, through complimentary notice of their services. This neglect of the others was, however, purely unintentional, and entirely defensible on the ground that, at the time the compliments were paid, many of the complainants were either

⁵ The numbers in this column do not include the pages of the Appendices to the Reports.

⁶ These figures represent the totals of line and staff for each year.

not born, or were so young as not to be interested in naval affairs beyond sailing a boat in a tub. Had it been otherwise, they would doubtless have received similar commendation to that found in the annual Reports, coupled with the names of Gedney, Blake, Porter, Patterson, Rodgers, Jenkins, Geo. M. Bache, Davis, Stellwagen, Almy, Craven, Wainwright, Trenchard, Febiger, Sigsbee, Bartlett, and those of many others.

A mile-stone has now been reached from which it will be well to consider the road passed over, and the way still beyond. In the first paper, only the illegality and impropriety of the Secretary of the Navy's course was discussed, and three only of the points attempted to be made by the Chairman of the Sub-Committee on Sundry Civil Expenses, in a letter to a gentleman of Philadelphia, were discussed and refuted. Space did not permit of more within the limits of that paper. This has already supplied and will continue to supply the intentional omissions and need, in some places, of amplification of the first paper, by the fuller discussion of the views emanating from the Navy Department and from the Chairman of the Sub-Committee on Sundry Civil Expenses. By permission of the Engineers' Club, of Philadelphia, is now given in full the correspondence between it and the Chairman; in being able to publish which lies a great double advantage;—to the Survey, in avoiding any possible suspicion of misinterpreting; to the Chairman, of the production of his own version, in his own language, of his views with relation to the Survey.

“ENGINEERS' CLUB, OF PHILADELPHIA.

“May 30th, 1884.

“HON. SAMUEL J. RANDALL, M.C.

“Washington, D. C.

“DEAR SIR:

“I have just learned that a Bill to merge the U. S. Coast and Geodetic Survey with the War and Navy Depts. is about to be presented to Congress.⁷

“It is my opinion that its passage would seriously disturb one of the *most efficient* Departments and add greatly to the already unjust and unwise discrimination of the Government against the *Civil Engineering* profession.

“May I respectfully request your influence against this Bill, at least until this Society (which has 318 members) and the other *Civil Engineering* associations of the country have an opportunity to be heard from.

“Very respectfully yours,

“HOWARD MURPHY,

“Sec'y and Treas.”

⁷ The mistake of speaking of the War, instead of the Interior Department, grew out of the fact of the news having but just arrived. The charge of the note is substantially the same, irrespective of the mistake—that of intended dismemberment of the Survey. That the Secretary thought so is clearly shown by the tenor of his second, even stronger, letter, written after he had received Mr. Randall's correction of the mistake; where he continues to speak of the general tendency to subordinate civil to military rule.

"HOUSE OF REPRESENTATIVES.

"WASHINGTON, D. C., June 2, 1884.

"HOWARD MURPHY, Esq.

"DEAR SIR :

"Your letter received. There is no disposition on the part of the Committee on Appropriations to interfere with the officials and the *personnel* of the Coast Survey proper. It is now under the nominal control of the Sec'y of the Treasury, who, I am informed, is not adverse to being relieved of the same and having it transferred to the control of the Navy Dept., where in so far as coast survey is concerned it naturally belongs, that portion of the service now being done by naval officers and men. It is thought further to transfer the Geodetic portion of the Coast Survey to the Geological Survey as the natural place for it to be. The purpose of the Committee having been misrepresented, I will say that the Committee think economy will be promoted by the proposed transfer, the efficiency of the service not impaired, and the *personnel* remain in the same hands. The transfer will also prevent duplication of the work, and with the money thus saved, the service can be increased and portions of the country surveyed where mineral resources are not now scientifically known.

"When I am next in Phila. I shall be glad to see you and more fully explain the purpose of the Committee.

"Yours truly,

SAML. J. RANDALL."

"ENGINEERS' CLUB, OF PHILADELPHIA.

"June 17th, 1884.

"HON. SAML. J. RANDALL, M.C.

"Washington.

"DEAR SIR :

"I acknowledge the receipt of your esteemed favor of 2d inst. and have presented it to the Club, but, according to our rules, no business can be transacted at our scientific meetings. Our last was of this class, so the question could only be informally discussed, but the sentiment may be seen in the enclosed marked 'Record of Meeting,' which is sent for publication to the scientific press of the country.

"On Saturday, 21st inst., we will have a business meeting, when a committee will report a resolution for formal action, which will be immediately forwarded to you.

"We do not presume to discuss a question of statesmanship with you, but we do claim to understand *something* with regard to the general and detail management of the special work for which we were educated and to which we have given our lives. Should not the civil engineers of the country, above all other persons, know *how* and *by whom* a SURVEY should be conducted?

"But few of our members (on an active list of over 300) have any connection with Gov't service or any intention or desire to be so connected, and the absence, on our part, of narrow-minded rivalry is, perhaps, best evinced by the fact that Colonel Wm. Ludlow is now our President; but will you think for a moment of what the CIVIL Engineers have done to promote the material progress of this country, and then tell us WHY steps should be taken to further subordinate that profession (even if it is still *employed*), upon strictly CIVIL work, to the military and naval authorities?

"But, as civil engineers do not depend, thank Heaven, upon the *Government* for professional opportunities, attention may be confined to the point of main importance to them and to the country, which is that they DO DEPEND upon the present and future work of U. S. C. & G. Survey for ACCURATE BASES FOR SECONDARY WORK.

"As no one but an engineer can fully and practically appreciate the growing importance of this, and how splendidly it has been and is being accomplished by

the present correct methods; and as every engineer with whom the writer has conversed has considered the proposed change a mistake, a pity, a shame or an outrage, will not you and will not your Committee listen and give due weight to such expert testimony?

"You might as well destroy our standards as destroy our CONFIDENCE IN THEM!

"I send you our list of members of Oct., 1883, with additions to date pasted in, and marked copies of 'Bulletin,' June 13th, and 'Record,' June 16th.

"May I have something from you to lay before our meeting on 21st inst.?

"Yours very respectfully,

"HOWARD MURPHY,

"Sec. and Treas."

Omitting the preliminary, very complimentary proceedings of the Engineers' Club with reference to the Survey, referred to by Mr. Murphy in his second letter, under the head of the "Record of Meeting," which he transmitted to the Chairman of the Sub-Committee, the final action of the Engineers' Club took the form of the following Resolutions, engrossed, printed, and transmitted to the members of Congress representing the State of Pennsylvania.

"ENGINEERS' CLUB OF PHILADELPHIA.

Rooms, No. 1523 Chestnut Street,

Philadelphia, Pa.

"June 21st, 1884.

"HON.....

Washington, D. C.

"DEAR SIR:

"At a Business Meeting of the Engineers' Club of Philadelphia, held June 21st, 1884, the following were unanimously adopted:

"WHEREAS, We, the Engineers' Club of Philadelphia, have learned that a bill has been drafted in the sub-committee on Sundry Civil Appropriations of the U. S. House of Representatives, the purport of which is to merge the U. S. Coast and Geodetic Survey into the Navy and Interior Departments.

"AND WHEREAS, Under existing laws and regulations, such a practical dissolution of this distinguished and efficient organization must result in a lowering of the high standard attained, without producing any equivalent on the score of economy or expediency.

"AND WHEREAS, The changes now proposed were tested, both in 1834 and 1851, and in each instance proved a failure, therefore it is

"Resolved, That in the opinion of the members of this organization the proposed change in the status of the U. S. Coast and Geodetic Survey would be prejudicial to the best interests of the Government Service.

"Resolved, That the Members of Congress representing the State of Pennsylvania be, and are hereby, respectfully and earnestly requested to oppose the passage of this bill.

"WILLIAM LUDLOW, President.

"HOWARD MURPHY, Secretary and Treasurer."

The Chairman of the Sub-Committee gave, in connection with the same subject, to other gentlemen, besides the Secretary of the Engineers' Club, the intimation that he would be glad to see them, when next in Philadelphia, and more fully explain the purpose of the Committee.

Inquiry at the time failed to elicit the fact that opportunity had ever been afforded for having his wish gratified. There is, however, in the Chairman's letter, just given in full, more to be explained away than would render graceful further explanations to prove that the Sub-Committee possessed the knowledge upon which should be based action.

The Chairman of the Sub-Committee says that the Coast Survey "is now under the nominal control of the Secretary of the Treasury, who, I am informed, is not adverse to being relieved of the same and having it transferred to the control of the Navy Department."

Now, as was mentioned in the first paper, the Secretary of the Treasury says, not only that he is averse to being relieved of the hydrographic work of the Coast and Geodetic Survey, but that he has expressed to the Secretary of the Navy his disapprobation of the proceedings looking to that end.⁸ The attitude of the Secretary of the Treasury, of which, by attempting to define it, the importance is admitted, should not, certainly, have been allowed to rest upon the doubtfulness of hearsay in so important a transaction.

Can it, as the Chairman states, be truly said of the Coast Survey proper, as he terms it, that it is, in contradistinction to any of the other bureaus, only under the nominal control of the Department under which it is placed by law? Any bureau, under any Department, has an independent dependent organization and movement, is a wheel within a wheel in the governmental machine. Because it is materially represented in Washington by a building separate from that of the Treasury Department, it is none the less part of the Treasury Department. The Treasury in its primary aspect is an abstraction. In its secondary aspect, as the Treasury Department, it is a concretion. As a part of this latter the Coast and Geodetic Survey exists, without being represented in Washington by the same mass of brick or stone; and would be just as much as now a part of the Treasury Department, if its representative building were the same, or if it were another, a thousand, instead of being, as it is, two miles away.

The coast survey part of the Coast and Geodetic Survey, says the Chairman, naturally belongs to the Navy Department, "that portion of the service now being done by naval officers and men."

Does it? The coast survey part of the Coast and Geodetic Survey is geodetic, and the Navy Department does not do geodetic work.

"It is thought further to transfer the geodetic portion of the Coast Survey to the Geological Survey as the natural place for it to be," think the Sub-Committee.

There it is again. Why, does not every one know that it is all geodetic? The view of the Sub-Committee as to the expediency of

⁸ Secretary Folger died on September 4. The fact that this paper was written some days before his death, will account for the tenses of the verbs used in the passage here.

this connection differs entirely from that expressed in the passage quoted, in the first paper, from the report to Congress of the National Academy of Sciences.

"The Committee think," says the Chairman, "economy will be promoted by the proposed transfer, the efficiency of the service not impaired, and (*sic*) the *personnel* remain in the same hands."

If the Sub-Committee do not know more about the matter generally than has been shown by their Chairman, how can they know that economy will be promoted by the transfer? If the efficiency of the service would not be impaired, why should those who are in the service think that it would be? If the *personnel* is to remain in the same hands, what is the use of transferring it?

"The transfer," continues the Chairman, "will also prevent duplication of the work, and with the money thus saved, the service can be increased and portions of the country surveyed where mineral resources are not now scientifically known."

The Survey has yet to learn that there has been any duplication of work. This statement was explicitly denied two years ago by the Survey, whose officers will not be doubted, they feel confident, now that they find themselves held in so high regard by the Sub-Committee's assurance that "there is no disposition on the part of the Committee on Appropriations to interfere with the officials and the *personnel* of the Coast Survey proper." If there is no duplication of work, where is money to be saved? It cannot be saved by transferring the hydrographic work to the Navy Department; for that course, in default of geodesy there, would cost then more. It cannot be saved on duplication that does not exist. Then, where is the saved money to come from, in the interest of the development of the mineral resources of the country? A few thousands of this prospective, not actual, this purely hypothetical saving, were lately turned over to the Geological Survey by the Sub-Committee, and recovered by the Coast and Geodetic Survey through the Committee of Conference. This is the only saving possible; so far as known, the only one made,—purely theoretical, quite in the air, as it were.

In fine, it would take many visits to Philadelphia, a life-time longer than that of Methuselah, a listener endowed with equal longevity, and a patience equal to it, to enable the Chairman to convince him that the Sub-Committee know anything about the matter, however great their erudition upon other points which his venerable auditor may be ready to concede.

All this construction is like a child's making a planetary system of mud-pies. There is very little system, but a terrible mess of worlds and child. Really, one is tempted to think the Chairman daft with his economy. If to be an economist is to possess a blue-pencil and score right and left, we can all be little financiers for a cent.

Economy in a household may not be degenerate, even if it saves the cheese-parings and the candle-ends and counts the potatoes, for the household may be poor, and it is always individual: there can be no question in it of development. But political economy is the science of the correlation of functions in the body politic, and knowledge of the laws that govern the production and distribution of wealth. The executor of its laws (and all civilized men are either that or obstructors of them) cannot save but by spending, if he would help adjust the balance of these natural functions, without whose nice adjustment there can be no healthful action and reaction among them conducing to the highest interest of a people. The wider the territory, the more diversified the industries and production of a people, the more are required intelligence and skill in the legislator, to grasp the relations among the productive, the distributive, and the protective agencies in active operation, and to further their harmonious working and development. The law, being universal, embraces the Coast and Geodetic Survey as well as everything else. It is exemplified in all business, and permeates the whole life of every civilized people; indeed is omnipresent in beneficent action, except where it is obstructed or stifled in its action in the conduct of public affairs.

In 1858, Professor William P. Trowbridge made an elaborate investigation of the relation between expenditure and work upon the Survey, and ascertained that, as compared with the interval between 1832 and 1844, the equal interval between 1844 and 1856, with an increase of thirty-three per cent. in expenditure, gave an increase of results of sixty per cent., showing a gain in economy of twenty-seven per cent. He says in his report upon the subject, that the expenditures and results on the Western coast, being deducted from the whole (proper, for fairness of comparison, because the cost of labor and material was so abnormally high there at that period), the economy of increase of appropriation for the Survey is still more apparent. Then, instituting the comparison, with that deduction, in the same way as before, between the intervals of 1832 and 1844, and 1844 and 1856, respectively, as here paired, the increase of results as compared with expenditures is as fifty-four to twenty-two per cent., showing a gain of thirty-two per cent. in economy.

The point attempted to be made by the Chairman of the Sub-Committee, that the Coast and Geodetic Survey and the Navy duplicate each other's work, is like an echo of the Secretary of the Navy's charge of some two years ago. Yet it may not be an echo. As admitted in the previous paper, the same causes that influenced the one to come to certain conclusions may have influenced the other in reaching the same conclusions. Between these personages we should not expect other echo than that like the remarkable one originated by the mountain farmer, who, taking a party of visitors to the magic spot,

and shouting halloo, received for response, "Now, you Bill Stokes, just give me back my knife."

The debate in the House of Representatives, from which quotation was made in the first paper, in which debate maladministration in the Navy Department was sharply charged by the Chairman of the Committee on Appropriations, was no longer ago than July 1, 1884. Yet gentlemen must be, while official, polite, and while social, still polite, and even more polite. Those much maligned organs of truthful speech—the newspapers—represent that, on the occasion of the late reception to the returned Arctic voyagers, the two gentlemen in question met at a clam-bake under the auspices of General Butler, and not at daggers' points, and were polite, as be seemed the occasion. The clam, as is well known, although uncompromising in the toughness of its own nature, hath yet a softening effect upon the heart of man. It is not to be expected that the augurs shall not meet in public and laugh in their sleeves. But, really, in this case, it seems like the rare union of Roman virtue with phrase Pickwickian! Who, however, can say—let no man be censorious—that it might not have been sincere if, at the close of the entertainment, the Secretary, referring to the remarks of July 1, should have addressed the Chairman in the words of Romeo, "the reason that I have to love thee doth much excuse the appertaining rage to such a greeting," and then both should have smiled as they parted, the smile of the augurs, and wended their respective ways?

Heretofore, as simplifying matters to the general reader, the proposed transfer of the hydrographic work of the Coast and Geodetic Survey has been either mentioned or alluded to as a proposed transfer to the Navy or to the Navy Department. It becomes necessary at this stage, for the understanding of what is to follow, to specify the particular agency under the Navy Department which would, in the event of the transfer, have charge of the work. This is the Hydrographic Office, a Division under the Bureau of Navigation, which, in turn, is under the Navy Department.

This agency—the Hydrographic Office—upon which the Secretary of the Navy and the Chairman of the Sub-Committee agreed,—if they ever agree upon anything,—as the most proper of all agencies to which to turn over the hydrographic work of the Survey, ought to be a something at least equal in administrative ability to the Coast and Geodetic Survey. It ought to be at least this to reconcile any one to a change in the direction indicated. It ought to be at least this to men in power who have at heart the public weal, who instigate and further the change. It behooves us, therefore, in order to enable ourselves to judge of the expediency of the transfer for this one reason alone, to examine into the character of the Hydrographic Office as to its administrative capacity.

As the highest authority that can be cited on the subject, let us examine the report written by the present Chief of the Hydrographic Office, no longer ago than one year,—or very little more, say fourteen months from the present writing, or, as the report specifies on its title-page, “for the fiscal year ending June 30th, 1883.” Commander John R. Bartlett, of the Navy, the writer of the report, addressed to the Chief of the Bureau of Navigation, is recognized on the Coast and Geodetic Survey as an able officer and excellent hydrographer, he having been attached to the Survey for four years previously to taking charge of the Hydrographic Office. He must justly be considered high authority,—he is an experienced hydrographer, and he testifies in regard to the Office of which he is chief. And the following is his testimony as to some of the administration up to the time when he recently took charge of the Hydrographic Office. The reader will please remember that the testimony is from a report for the fiscal year ending June 30, 1883, by an officer only recently in a position to correct mistakes in the Hydrographic Office.

“The original cost of engraving the 165 plates prepared by the office has been upwards of \$150,000.⁹

“From an examination of the various Government offices, and of private copper-plate printing establishments in New York, it appears that it is the universal custom to make at least one electrotype or alto of all engraved plates. From this alto a second electrotype or basso is made from which impressions can be taken. The original plate is thus relieved of wear and its life is prolonged indefinitely, since new electrotypes can be made from it at any time. The practice of electrotyping plates has not hitherto prevailed at the Hydrographic Office, only 5 out of the 328 plates having been reproduced in alto, and only four of these in basso. As a measure of economy, all the plates in the office should be immediately electrotyped. Unless this is done it will be necessary to recut the plates as they wear out. Many of them already show signs of wear.”

First Comment. So, although having had on hand for years great numbers of valuable plates, the imperfection of practice regarding them is not known to the public until 1883, when it is pointed out through the superior knowledge of an officer who had just had four years' experience upon the Coast and Geodetic Survey. Yet this imperfect practice had violated, according to his opinion (to which may be added every one else's), “universal custom.” And the ignorance or neglect had been so great, moreover, that many of the plates, Commander Bartlett says, “already show signs of wear,”—are, in a word, damaged.

Commander Bartlett says,¹⁰ also,—

“It has hitherto been the practice, upon the receipt of a new edition of an admiralty chart, to correct from it the old copies on hand in the office. These corrections, made upon each copy of the chart in pen and ink, not only involved great

⁹ Pp. 4 and 5, annual Report of the Hydrographer to the Bureau of Navigation, for the fiscal year ending June 30, 1883.

¹⁰ Pp. 6 and 7, *Ibid*.

labor and expense, but were of necessity imperfectly made. While slight corrections must continue, as before, to be entered by hand, it is now proposed, in the case of new editions, to adopt the simpler and far less expensive plan of replacing the old copies by the purchase of new ones." . . . "It has hitherto been the policy of the office to devote a large portion of its energies to this work of reproducing foreign charts. One-fifth of the whole number of publications of the British admiralty have been copied on stone or on copper, and the charts printed therefrom have been stored in the office. They are kept for the double purpose of issue to ships of war and of sale to private individuals. It is a question whether they are of any material benefit. The copper-plate reproductions are exceedingly costly. They have, however, an advantage over the photolithographic copies, in that corrections may be made on the copper and new copies may be printed from the plate as corrected.

"The photolithographic reproductions, while less expensive at the outset, can only be corrected by alterations on each copy of the chart in pen and ink. The waste of labor and the waste of money in this hand correction of 83,000 charts is simply inconceivable, and, moreover, it could not be adequately accomplished with even unlimited labor and money. The office has for some time made the attempt to perform this task, but after a protracted trial the conviction is formed that it is impossible, and that, if it were possible, it would not be worth the effort. The obsolete charts, instead of being laboriously corrected, should be replaced by the purchase of new editions from the corrected plates of the British office. The conclusion is therefore irresistible that no more copies should be made of foreign charts by a process which does not admit of correction on the original plate or stone. It is a further question how far reproductions of any kind are desirable. Certainly, if the policy of reproduction is a sound one, it should be clearly apparent why these particular 620 charts were chosen for reproduction and the 2380 others on the admiralty catalogue were rejected. It is impossible, however, to ascertain any general principle which has hitherto governed the selection. The copies form a miscellaneous collection, comprising localities widely distributed and of varying degrees of importance, including the waters of every ocean and coasts and harbors on every continent. That most of them serve no useful purpose is evidenced by the fact that of the 620 charts copied, copies of only 216 have been sold, leaving 404 for which there has been no demand whatever during the past year. Many of these last have been issued to ships of war, but an ample supply for this purpose can be obtained by purchasing copies, without the expense of reproduction."

Second Comment. These passages fairly bristle with evidence of bad administration. No comment is needed but that of condensed recapitulation. Money has been wasted for years in photolithographic reproductions, copies of charts struck off from which have been laboriously corrected by hand, to conform to new, original issues, when the new issues could have been bought, comparatively speaking, for a song. The 620 plates reproduced present no intrinsic evidence why they, rather than the 2380 rejected, should have been chosen; and anyhow, charts from them do not sell, and those issued to ships of war could be got better and cheaper elsewhere. And this system has been in operation for years.

This is the office to which the Secretary of the Navy and the Chairman of the Sub-Committee on Sundry Civil Expenses would commit the hydrographic work of the Coast and Geodetic Survey,—the one, in the interest of economy, the other, in the interest, perhaps

of no economy, but on the plea that it naturally belongs to the Navy. This is only one side of the Hydrographic Office, it is admitted,—the bad side. The Hydrographic Office has done and is doing good work of the kind for which it was created.¹¹ It must improve, too, evidently, under so energetic and outspoken a chief as Commander Bartlett has proved to be. But it must, at the same time, be evident to the reader, that it would be by no means proper to relieve the Coast and Geodetic Survey of its hydrographic work so as to commit it to this office, which, although under its present direction an office of promise, is clearly embryonic.

All persons will agree, after reading the testimony by Commander Bartlett, just quoted, that his recommendation to regulate the office in the interest of economy should be adopted. He says, "By limiting this branch of chart work as above described, the Hydrographic Office will be enabled to devote its energies to the work for which it is peculiarly fitted and intended,—the performance of its share of general hydrographic work by the publication of original surveys made by officers and vessels of the United States Navy."¹²

It is rumored that Commander Bartlett has since recanted that view. If so, it is to be hoped that he will reconsider his change. The hydrographic work of the coast is not general hydrographic work. Certainly, with his knowledge, he can hardly think that hydrography pure and simple can be taken away from the Coast and Geodetic Survey and committed to the Navy or to any other similar agency. He knows, too, that there is no such thing on any coast as hydrography pure and simple; and that when it comes to such elaborate hydrography as that on the coast of this country, such as that executed by the Coast and Geodetic Survey, the work carries with it geodetic operations in their largest scope, and that they are in no wise proper to be under the direction and charge of the hydrographic office of any navy.

So many side-lights have now been thrown upon this subject, in the course of the preceding discussion, that the reader ought to be able to perceive the truth of the simple statement of fundamental fact in all its nakedness. The last remark, if clearly comprehended, that the hydrographic office of no navy whatever is fit to have charge of the hydrographic work of its own coast, contains the whole kernel of the matter. The reason for this, suppressed lately in certain quarters, from interested motives, is that there is hydrographic work and hydro-

¹¹ "There shall be a Hydrographic Office attached to the Bureau of Navigation in the Navy Department, for the improvement of the means of navigating safely the vessels of the Navy and of the mercantile marine, by providing, under the authority of the Secretary of the Navy, accurate and cheap nautical charts, sailing directions, navigators, and manuals of instructions for the use of all vessels of the United States, and for the benefit and use of navigators generally." Revised Statutes; par. 431.

¹² P. 7, *Ibid.*

graphic work. The hydrographic work executed by this country, by Great Britain, and by other countries, on foreign coasts, is undoubtedly good work of its kind. The day was when, and not very long ago, it was not good of its kind. That day, there is reason to believe, has finally passed away. The excellence—the perfection, one may say—which geodetic surveying has reached in civilized countries, has raised to a higher plane all work of lesser grade.

But the surveys executed on foreign coasts are not, and never can be, of the refinement practiced in those at home. They are, and of necessity must continue to be, from causes too numerous to mention, but known to every geodesist, and from other causes that ought to be apparent to every one (those relating to time and expense), much less refined than the surveys, whether on land or coast, made by nations in their own countries; upon which depend internal development, commerce, armament, minute knowledge of their very ocean gates. If an individual spot, not at the present time known even to most experts to exist, could possibly be pointed out on the surface of the globe, where some elaborate work, like that of the Coast and Geodetic Survey, has been done by a foreign nation, it would only prove, by its being an exception to the rule, the point here made. To affirm that such a place does exist, is to say that it includes, humanly speaking, perfect base-lines, astronomy, triangulation; determinations of azimuth, of local deflection of the plumb-line, determination of magnetic declination, dip, and intensity; topography, spirit-levels, and other determinations of heights; observations on tides, winds, currents, and on temperatures of air and water. Are all these proper for foreign surveys; have they ever been introduced into foreign surveys; would they be justifiable? Yet, even all these do not represent the results of the Coast and Geodetic Survey. Will any one claim that surveys in foreign waters are made with results like, and even greater than these; that if they are, they ought to be; that if they are or are not, naval officers could execute them; that if they could not execute them abroad, they could at home; that if they could not at home, they should be allowed to have the direction of civilians who have made such surveying their profession, and thus to constitute the charge a sham?

No body of men, were they the brightest and best that ever lived, can be depended upon, if they belong to either branch of the military service, for perpetuating the best methods in geodesy, and for always being ready to labor within that field,—simply because, belonging to either Army or Navy, they can have only limited terms of duty on any geodetic work, and are withdrawn to the practice of their own profession in time of war. Immediately on the breaking out of the Mexican War, all officers of the line of the Army, and some of the staff, were detached from the Survey. The same condition of affairs existed with

reference to naval officers. It will be seen further on that the Navy Department could not then answer favorably application from the Superintendent for the most urgent needs of the Survey. In the war of the Rebellion, by the beginning of the year 1863 all the army officers on the work had been detached, and only one naval officer remained. On the other hand, of the nineteen civil assistants, fourteen sub-assistants, and twenty-two aids, on the Survey, twelve assistants, seven sub-assistants, and ten aids served in their professional capacity with the military and naval forces of the United States.

Are the reasons against the project of transfer of the hydrographic work of the Coast and Geodetic Survey to the Navy still deemed insufficient? More could be given, but these surely should suffice. It should suffice merely to quote the report of the American Association for the Advancement of Science, which said, through its distinguished Committee of Twenty, that if the work "were carried on under distinct organizations, then would result a want of co-operation as to time, methods, and objects, by which the hydrographic survey would fail in a great measure to derive from the land-work those elements of accuracy which are essential to its perfection." But a surplusage of reasons must always be given to counteract movements inspired by the hope of personal aggrandizement; and so it has been given here.

The Hydrographic Office, it will have been seen, is capable of conducting hydrographic work like that of the Coast and Geodetic Survey, only upon the terms that a civilian corps of experts shall be turned over from that Survey to the Hydrographic Office, to perform the functions upon which all hydrographic work of the first class depends. The move of the Secretary of the Navy and the Sub-Committee means to the country, whatever the intention may be, the transfer to the Hydrographic Office of the nominal, as well as real control of the hydrographic work of the Survey, but in so doing, assigning to it the real, without nominal, control of geodetic operations, for which it is not fit. In a word, the intention, accomplished, would constitute either a failure or a sham.

There is a witness, evidently forgotten by or unknown to the powers that be, who has not yet been summoned, because it was desirable that the first witnesses cited to appear should have created a prepossession in his favor that he knew whereof he spake. This witness is Alexander Dallas Bache, a graduate of West Point, first in his class, where he never received a mark of demerit; president of Girard College, principal of the Philadelphia High School, professor in the University of Pennsylvania; the friend of Humboldt, Arago, Murchison, and other scientific men of Europe; *facile princeps*, as they themselves said, among all his brethren of America. This forgotten man, not respected more than he was admired, nor admired more than he was loved; this man, distinguished alike by his mind, his attainments, and his genial traits

of character ; a loyal citizen, who died of over-work in the field of duty, knightly, in harness, as if he had been slain on the battle-field, may be allowed to say one word in behalf of the great work of which he was the most distinguished ornament, for the great work, which, from the time that he assumed charge of it, until overborne by it and other labor, he fell under the heat and burden of the day, relinquishing in it the pride, the glory, and the delight of his whole mature life, was never for a moment lost to his most earnest and best thought.

"The reorganization of the Coast Survey, under legislative authority, in 1843, embodied all the experience obtained up to that date, both of trials which had succeeded and of others which had failed ; it confirmed and gave the force of law to the union in one corps, which had gradually grown up, of civilians, officers of the Army, and officers of the Navy, serving under a neutral department ; under which alone they could be united,—namely, that having control of matters relating to commerce and navigation.¹³ It is easy to see that without a permanent nucleus for such a work, the objects and aims must be wavering and unsteady, the methods wanting in uniformity from year to year and from party to party, and the results heterogeneous in kind and in form. Confusion and waste would result from such an organization, and the Survey would in time be abandoned. The scientific parts of such a work require diligent study and devotion to mathematical and physical science, to grasp them in their various bearings ; and it is not too much to say, that, unless such a work came up to the demands of science and scientific men of the country, it could not long stand. That the theoretical knowledge acquired at the Military Academy should be reduced to practice in the Survey, by those officers of the Army who have an inclination to similar pursuits, to its advantage as well as to their own, will readily be seen ; and up to the point where details would interfere with the duties of the arm to which the officer belongs, Congress has conferred upon the work a right to seek his services. The War Department judges whether they can be granted or not.

"The law of 1843 very properly limited the services of officers of the Navy to the hydrographic part of the work,—the portions which have a professional bearing, and towards which the inclination of a nautical man may turn with professional pride. Experience has fully shown the advantages of this organization in general. The tendency resulting from the variable elements (the Army and Navy), is nevertheless at times to lessen the results produced, by the necessity for turning aside from actual work to give instruction, and from the loss of experience acquired at the expense of the Survey, by the removal of officers, caused, no doubt, by the exigencies of their proper service, and yet reacting severely upon the Survey. The experience and knowledge of Humphreys, Johnstone, and Prince, of the Army, and of Davis, Patterson, and Porter, of the Navy, cannot readily be replaced ; a detail may be filled, but the knowledge immediately available is not supplied.

"The injunction of the law to employ as many officers of the Army and Navy as practicable in the Coast Survey, I have never lost sight of. On the breaking out of the Mexican War, five staff and nine line officers were upon the work. The number of hydrographic parties has been increased from two in 1843 to eight in 1850.

"At the close of the war I again applied, through the Treasury Department, for the renewal of army details. . . . When my last application for line-officers was refused, the War Department stated that staff-officers would, if practicable, be

¹³ Pp. 6 to 8 of Prof. Bache's report to the Secretary of the Treasury, Hon. Thos. Corwin, showing the progress of the Survey for the year ending Nov. 1850. Ex. Doc. No. 12, House of Representatives, 2d Session 31st Congress, 1850.

assigned to the Survey. Now that this was found impracticable I renewed the application for line-officers, which has been favorably considered by the War Department, and five officers have been detailed for the service.

"The increase in the number of officers of the Navy attached to the Coast Survey has in like manner been carried as far as the Navy Department has found it possible to make the details. Such has been the demand for officers for the more immediate duties of the naval service, that those engaged in hydrographic reductions in the office were generally detached from the Survey; the hydrographic parties were diminished to one-half, or less than one-half, their numbers on coming to the Office to reduce their work; and finally, the additional officers required for the Texas section this winter could not be procured when applied for, the Navy Department stating that in the present condition of the service, two passed-midshipmen, junior to the master who had been ordered, and who stands near the head of the list of passed-midshipmen, cannot be detailed. Owing to the same exigencies, the vessel for that section still remains without her complement of officers.

"So great have been the exigencies of the naval service, that more than one-half of the officers attached to the Coast Survey a year since have been changed. The chiefs of parties feel sensibly the impediment to the progress of the work under their charge, which this rotation produces, and which no exertion of theirs can compensate. With officers and a crew more or less entirely new to the business of surveying, a portion of each season must be spent in teaching instead of working. The present organization affords a school of practice for the young officers of the Navy, and as such, is valuable to the country. It must be obvious, however, that in point of economy and expedition, the plan of employing persons regularly trained to the occupation, keeping them steadily at the work, and giving them a compensation proportioned to their knowledge, skill, and industry, would be preferable. The statistics of the relative economy of the different parts of the work as at present conducted, confirm this view of the subject."

In a still more elaborate statement, on the same topic, made near the beginning of the following year, in a report by the Hon. Thomas Corwin, Secretary of the Treasury, in response to the resolution of the Senate calling for his views regarding the proposed transfer of the Coast Survey to the Navy Department, a report which is generally regarded as having been written by Professor Bache, and which, in fact, from intrinsic and circumstantial evidence, could have been written by no other person, the following passage occurs:¹⁴

"When the Mexican War broke out there were fourteen officers of the Army upon the work, all but three of whom were withdrawn. Notice was given that the Navy officers might necessarily be withdrawn. Had there been no civil corps in such an event, the work would have been stopped just when a knowledge of our harbors was most wanted."

Could anything be more conclusive than all this? It shows, from the experience of a man who at the time of writing had been Superintendent of the Survey for seven years, that the refined methods of the Survey could not be maintained and transmitted save by the civilian nucleus of the Survey. It shows that, with an organization including officers of the Army and Navy, the work is more expensive than if

¹⁴ Pp. 23 and 24 of the report of the Hon. Thomas Corwin, Secretary of the Treasury. Ex. Doc. No. 36, Senate, 2nd Session, 31st Congress, 1851.

performed by civilians only. It shows that such an organization is justifiable only (and it is confessedly to be justified) by the fact that officers of both branches of the military service, especially those of the Navy, obtain practice inuring to the possible benefit of the country. It shows that, in time of war, the portions of the organization belonging to the two branches of the military service must be paralyzed by the exigencies of their own special services.

Yet people have been called upon lately by astute legislators to believe that the Navy is the proper administrator and executor, combined, of the hydrographic work of the coast. Congress surely will repudiate proposed legislation based on such ignorance as has been shown of the history and experience of the Survey.

In the homely wisdom of *Æsop's Fables*, uttered over five hundred years before the Christian era, we are taught, in the story of the Belly and the Members, the lesson of co-ordinative functions and powers correlated in their exercise, implying also the existence of subordination. We should certainly, in the nineteenth century of the Christian era, have advanced backward far enough to understand *Æsop's Fables*.

Let us consider this difference between co-ordination and subordination, as applied to the question before us. The hydrographic work of the coast of the United States is, and should be, subordinate to the agency which controls the land work, because it relates to that subtle element which, while it may, as forming the ocean, be said to be everywhere, may also be said to be nowhere without the land. From the days of the ancients, when the ocean was believed to be the universal mother, and the ebb and flow of tides to be caused by the breathing of the old man Demagorgon, seated in the bowels of the earth; when the ocean was the source of abject terror to the noblest minds, as something vast, illimitable, immeasurable, reaching infinitude; when it inspired even more than terror,—horror, at its glassy or turbulent surface, its treacherous and brutal power;—from these, even to our days, when the sentiment, divested of fear, is still one of awe, mirroring in the mind, not the image only, but the very presence of eternity, blended with a feeling which could speak in the magnificent strain of Byron in "*Childe Harold*"; yet, from the beginning to the present day, the ocean has been physically, although not morally to man, the same vast, untamed and untamable force lying in wait and roaring around the habitable earth, its treachery and fierceness conquered never by the strength of man, but mitigated only by the knowledge and address of the powerful hand that science has laid upon its mane. This, the same,—the ever to be the same, until all things cease to be themselves,—this ocean, fluid, is nowhere without the land. The position of not one drop of water that goes to form its mass is known without reference to the land. The briny deep that is at our doors might be translated to another part of the globe, and other water take its place, and we never the wiser for the fact. Indeed, it is

just so,—the ocean-streams making endless flow from one ocean-basin to another. And just as this is so of the individual drops of water and of the mighty mass in the ever-shifting sea, the surface presented to the eye, or the mass recognized by the plummet, is here to-day and gone to-morrow. The sea is the same through all the gamut of its moods, and yet, is of all things, except the air, the most inconstant and evanescent.

This ocean off our shores might be any other ocean but for this particular land. But for the land, any other ocean might be this. It is the bottom, that despite all this protean fickleness of being, gives individuality by which any place in the ocean can be identified, no matter through what processes of nature, short of cataclysm, it may have been changed. Consequently, it is not because the ocean on this coast is, as everywhere else, water, that the Coast and Geodetic Survey claims the survey of the coast as belonging of right to it as a survey of mensuration. It is because, as the reader will have observed, the bottom is nothing but an extension under water of the land, and, as such, is susceptible of being associated with the nicest geodetic operations. The ocean off our coast being, with reference to surveying, virtually the land, the hydrographic part of the work, equally with the topographical part, should be subordinate to the Coast and Geodetic Survey.

The case of the relations of the Coast and Geodetic Survey to the Geological Survey is widely different. These relations should, from the nature of the circumstances, be made relations of co-ordination with correlated aims. The Coast and Geodetic Survey being a work of scientific mensuration, wherever the system is applied by the Survey, it is applied with the most refined methods known to geodesy. The Geological Survey, on the one hand, deals only with investigation of the structure of the earth's crust, for the discovery of mineral deposits, for the promotion of paleontology, ethnology, etc.; and on the other hand, the Land Survey deals only with the rude measurement of lands in the public domain. Both of these works need scientific bases from which to proceed with their labors. The Geological Survey, for example, obtaining from the Coast and Geodetic Survey the length of a side of one of the triangles with which the Survey is proceeding across the continent, the azimuth (that is, the direction with reference to the true north and south) of the line, and the geographical position (that is, the latitude and longitude) of its extremities, possesses a base from which can be conducted over large areas what are called geographical reconnoissances, with all the nicety requisite for the purposes that the Geological Survey has in view. To carry with the Geological Survey the refinements of measurement practiced in the Coast and Geodetic Survey would be the most preposterous of plans, and most onerous to the Treasury. Suppose that that is not intended,—that these parcel-learned gentlemen, as Bacon calls such persons, should say, "Just

what you are proposing we have had in our minds in making our proposition, just the combination described between the Geodetic Survey and the Geological Survey, by which the Geological Survey could proceed from bases of precision upon long geographical reconnoissances." "Well, for that purpose," let us inquire, "is there any necessity for combination between the two Surveys, greater than that required for obtaining from the Coast and Geodetic Survey such bases as are needed; which would always be at the disposal of the Geological Survey in proportion to the means that Congress would furnish the Coast and Geodetic Survey for the purpose of determining such bases? Do the Secretary of War and the Secretary of the Navy, whose Departments pay officers and men in their respective services, consider it necessary to have little Treasuries for themselves?" They draw upon the Treasury Department, and the requisition is promptly filled.

So it is with the Coast and Geodetic Survey with reference to the Geological, Land, and State Surveys. The Coast and Geodetic Survey is, with reference to them all, a treasury of information about mensuration on the coast, and in the interior, on the lines of triangulation proceeding between the Atlantic and Pacific Oceans, and is capable of furnishing the best data to the Geological Survey, to the Land Survey, and to the State Surveys. All that is necessary for any one of these is for it to draw upon the treasury of the Coast and Geodetic Survey for any geodetic information, and the draft can be honored promptly in proportion to the means that Congress places at the disposal of the Survey to expend in acquiring the information for which it is to be drawn upon by any authorized agency.¹⁵

It is thus seen that there is no close combination, such as that described by the Chairman of the Sub-Committee on Sundry Civil Expenses, necessary between what he is pleased to call the geodetic portion of the Survey and the Geological Survey, but that between them there should be functional co-ordination.

The basal condition of civilization is the power of association. The higher the development of civilization, the more are co-ordination, subordination, and combination in every form, manifested in the fact of originally segregated individuals and masses working more and more to common ends through the division and correlation of labor. In this development is to be observed the action of the fundamental law of life, in the ascension from less to more complex forms, in the endless differentiation of parts maintaining coherence of design. In the Fable, the Belly did not claim to be prehensile, nor the hand to be able to digest upon its palm. The conspiracy against the former alleged that it con-

¹⁵ The Survey acts on occasions even in the capacity of pedagogue. Included in the manual of instructions to the Surveyors-General of the United States, is a treatise, prepared in 1878, by the Survey, for the use of the U. S. land-surveyors, showing how to determine the true and the magnetic meridian.

tributed nothing to the common stock of good. When, however, it was starved by the Members, it was soon found out that all the Members were dependent upon it, as well as it upon them, and had wellnigh come to grief. The moral applies to the Survey at this day.

All is said that can be said. If the reader is not convinced, then neither will he be, though one should arise from the dead.

The Survey has been loyal to its work, loyal to the country in the hour of need in war, loyal within and beyond its line of duty, in season and out of season, in all times and places. Humphreys, Stevens, McClellan, Sherman, Thomas, Poe, Foster, and many others of the Army; Porter, DuPont, Craven, Davis, Wainwright, and many others of the Navy, attest its war record. The daily, monthly, yearly record of its civil career lies in its magnificent contributions to science in books and maps, and in the warm friendship of the whole country's scientific and commercial life.

The Survey has had, could have had, but little ambition save to do its duty. It has had daily danger, exposure, small emolument, no retired pay, no pension-list, nothing, in fact, but the privilege of doing its duty. Its revered chief, Professor Bache, sometimes soothed repining at ignorance of it in high quarters, by the words, "Be patient; all will yet be well; the day will come when the work will be appreciated." Perhaps!—as in many another case, when those who have made it are not here to know. Ah, it was from his kindly nature that he judged too well of men! The children of this world are in their generation wiser than the children of light.

Yet, after all, the Survey has its reward in consciousness of having done its duty,—the highest reward possible to men;—no body of men was ever more devoted to duty. That must be enough; it must, it seems, suffice. Then, at the worst, having lived nobly, it can as nobly die. Of the two greatest things, not even the gods can deprive a man. Fame is a trumpet and its words are wind that bloweth where it listeth. Fortune showers her favors on the deserving and the undeserving alike, and deserved or undeserved, they come and go. But the two things of which not even the gods can deprive a man, are to live and to die well. Like Achilles, the Survey has lived in the light of open day, fearing no man, invulnerable to attack in front. Like Achilles, it is capable of speaking winged words, because they are the words of truth. Like him, it is capable in its wrath of dragging its foe behind its chariot around the plain of Troy. And like him, it can, after having spoken, be silent, and as calmly die.

"And as Achilles turned, with curving lip,
Contemptuous, to his men, an arrow sang,
And cleft the middle air, and dipped, and plunged
Full on the naked marble of his foot.
Through high-arched instep, ankle, and the strings

That bind the straining heel, it sped, and nailed
The wolf-skin sandal to the crimson sand.
Slow on one knee he sank, his strong, right hand
Staying his fall, and watched with steady eye
The full life draining from the wound, and spake,—
‘Mother, thy word was true. The end is come.’
Nor never spake again.”

But the Survey is not yet ready to believe that it must die. Before the intelligence and justice of the American people its cause is to be tried. Small fear is there that the American people are not well represented by the agency which has been selected for the trial in the form of the joint Commission of Congress.

